Service Manual

LCD Monitor Acer X163W

Table of Contents

Appendix : User's manual

Acer X163W Service Manual

Important Safety Notice

1. Safety precautions

This monitor is manufactured and tested on a ground principle that a user's safety comes first. However, improper used or installation may cause damage to the monitor as well as to the user.

Warning:

- This monitor should be operated only at the correct power sources indicated on the label on the rear of the monitor. If you're unsure of the power supply in you residence, consult your local dealer or Power Company.
- Do not try to repair the monitor by yourself, as it contains no user-serviceable parts. This monitor should only be repaired by a qualified technician.
- Do not remove the monitor cabinet. There are high-voltage parts inside that may cause electric shock to human bodies.
- Stop using the monitor if the cabinet is damaged. Have it checked by a service technician.
- Put your monitor only in a lean, cool, dry environment. If it gets wet, unplug the power cable immediately and consult your closed dealer.
- Always unplug the monitor before cleaning it. Clean the cabinet with a clean, dry cloth. Apply non-ammonia based cleaner onto the cloth, not directly onto the class screen.
- Do not place heavy objects on the monitor or power cord.

2. Product safety notice

Many electrical and mechanical parts in this chassis have special safety visual inspections and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Before replacing any of these components read the parts list in this manual carefully. The use of substitute replacement parts, which do not have the same safety characteristics as specified in the parts list, may create shock, fire, or other hazards.

3. Service notes

- When replacing parts or circuit boards, clamp the lead wires around terminals before soldering.
- Keep wires away from high voltage, high temperature components and sharp edges.
- Keep wires in their original position so as to reduce interference.
- Adjustment of this product please refers to the user' manual.

01 Product Specification

1. General:

Acer X163W is designed with analog interface input, it featured with embedded universal AC power supply . It's a green product and meets all ROHS standard. The power button and display control buttons are on the front of the monitor. The monitors shall automatically to display lower resolution video modes into 1366 x768 full screen display. The image can be adjusted through OSD control.

1.1 Main Features

Features	Specifications
Maximum resolution	1366 x 768@60Hz
Back light system	2 CCFL (top & bottom edge side)
Actual Resolution display	WXGA+ (1366 x 768)
Pixel pitch (mm)	0.252(H) x 0.252(V)
Display area	344.232 x 193.536 mm
Contrast ratio	500:1 (typ.)
Response time (Tr+Tf)	8ms (typ.),
Viewingangle (CR>=10)	45°(L)/ 45°(R), 20°(U)/45°(D)
Input interface	Analog(D-sub 15 pin)
Audio system	NA
Power management	Compatible with Energy Star
Plug & Play	VESA DDC2B /CI
University AC power supply	AC 100~240V, 50～60Hz

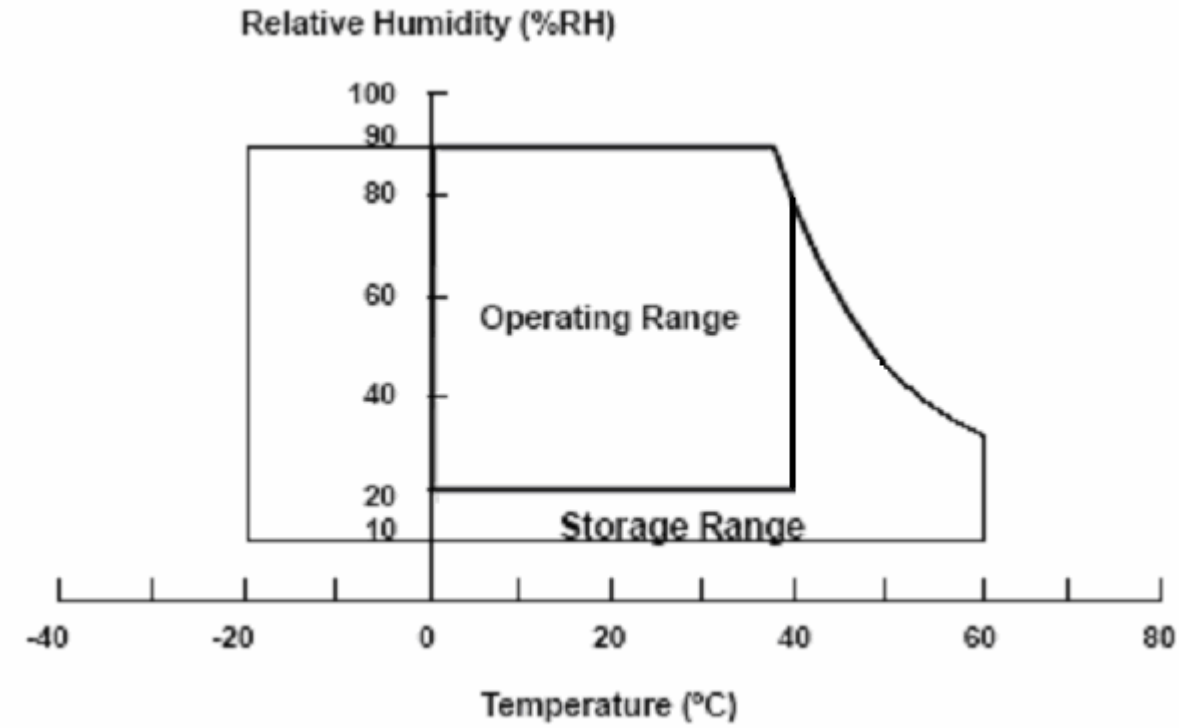
1.2 Accessories

Items	VGA cable	DVI cable	User's manual	Warranty card	Quick-start Guide	Installation Guide
Description	1.5m					
	•	NA	•	•	•	•

2. Operation Specifications

The unit should suffer no visible cosmetic damage and should operate with no degradation in display quality during exposure to the operating conditions and after exposure to the non-operating conditions, in any sequence.

2.1 Environmental conditions



Operating	Specification
Temperature range	0°C to 40°C
Relative humidity	20% to 90%
Altitude	0 to 3048M (10000 ft)
Storage	
Temperature range	-20°C to 60°C
Relative humidity	10% to 90%
Altitude	0 to 9144M (30000 ft)

2.2 Safety, EMC, Ergonomics and Compatibility Requirements

Items	Description						
Safety	UL/cUL	CB	Nemko /GS	CCC	BSMI		Other
	•	•	•	•	•		
EMC	FCC-B	CE	CCC	VCCI			
	•	•	•	•			
Ergonomics	TCO99	Nemko/Ergo					
	•	•					
Compatibility	Windows 95/98/Me		Windows 2000		Windows XP		Vista
	•		•		•		•
Power Management	Energy Star						
	•						

2.3 Electrostatic Discharge Requirements

Item	Condition	Spec	
Electrostatic Discharge	IEC61000-4-2(EN55024)	Contact discharge : 4KV	
		Contact discharge : 8KV	●
		Air discharge : 8KV	
		Air discharge : 15KV	●

2.4 Reliability

Items	Condition	Spec	Note
MTBF		≧ 40,000 Hours	Excluding the LCD, CCFL
CCFL Life time	Luminance becomes 50%	≧ 40,000 Hours(min)	Note1

Note1. Display an all WHITE field at mid Brightness and Contrast settings.

3. Electrical and Optical Characteristics and Performance

3.1 Main Power Supply

Items	Condition	Spec	Note
AC Input Voltage Range	Universal input full range	100~240VAC /50~60Hz	
AC Input Current	100Vac 240Vac	0.8A(max) 0.4A(max)	
AC Frequency Range	100Vac 240Vac	50Hz – 60Hz	
Inrush Current	100Vac,cold star,25°C 240Vac,cold star,25°C	40A (max) 60A(max)	
Regulator Efficiency	DC output full loading	≥75%	
Ripple and Noise	+14.2V output	<500mv	
	+5V output	<150mv	
DC Output Voltage and Current	VCC14.2V(13.5~16.3V) VCC5.2V(4.95~5.45V)	1.1A(typ.),1.4A(max) 0.8A(typ.),1.0A(max)	
Power consumption	without Audio	≤25W	
Protection			See Table-1
Power management			See Table-2

Table-1

Protection	Condition	Spec
SCP(short circuit protection)	**Short output (for 5V output it must be shorted before F802)**	**with auto-recovery function**
OPP(Over power protection)	**nominal AC input**	**32W (min)**

Table-2

Status	H-sync	V-sync	Video	Power	LED
Power On	on	on	active	≤ 25W	Blue
Power Saving	off	on	blanked	< 2W	Orange
	on	off	blanked	< 2W	Orange

	off	off	blanked	< 2W	Orange
Power Off	--	--	--	< 1W	Off

3.2 Backlight Power Supply

Panel: CMO M156B1-L01

Items	Specification
Lamp	2 CCFL
Input Voltage	14 (13.5~16.3)V
Input current	1.1A(typ.), 1.4A(max.)
On/Off switch level	5.5V≧Vno≧2.0 V (on) -0.3V≤Voff≤ 0.8 V (off)
Brightness PWM duty	Extra PWM duty:35% --100% ,High=3.3V, Low=0.0V, Freq=4* Vsync.freq..
CCFL operating Voltage	650Vrms (Typ.),
CCFL Current	3.0 mA (min.)
	7.0mA (Typ.)
	8.0mA (Max.)
CCFL startup voltage	≧1200 Vrms (0˚C)
Operating frequency	40~80 KHz
Protect delay time	> 1 second
Efficiency	≥75%(dummy load instead of CCFLs:100Kohm*2)

Note: Other panels please refer to the reference panel specs.

3.3 Brightness output

The test to verify specifications in this section shall be performed under the following standard conditions unless otherwise noted.

Temperature : 25 ± 5°C
Test pattern : white
Video Resolution : 1366 x 768
Video input level : 700 mV ± 2%
Warm-up time : 30 minutes

LCD Module	BL
CMO M156B1-L01	≥210 cd/m^2

Set brightness control and also contrast control at maximum, to measure the screen center, the light output shall ≥ BL cd/m^2 (as panel spec)

3.4 White balance

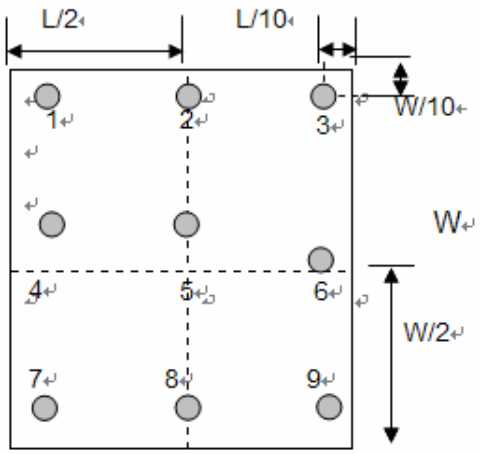
Mode		Chromaticity Coordinate	
		x	y
Cool	9300K	0.283 ± 0.030	0.297 ± 0.030
Warm	6500K	0.313 ± 0.030	0.329 ± 0.030
User		Panel While x	Panel While y

The test standard conditions refer to Sec 3.3. (Brightness and contrast are under default value)

3.5 Brightness uniformity

The test standard conditions refer to Sec 3.3.

$$\frac{\text{Min. luminance of nine points (backlight)}}{\text{Max. luminance of nine points (backlight)}} \geq 75\%$$



4. Input / Output Signal Specifications

4.1 Video signals

Items	Condition	Specification
Analog RGB signal	Input impedance = 75 Ohm	0.7Vp-p
Sync	Input impedance ≧ 2.2k Ohm	TTL level Logic High: 2.0V ~ 5.5V Logic Low: 0V ~ 0.8V Separate H/V-sync(+/-)

4.2 Signal Timing

4.2.1 D-SUB Inputs

Through D-SUB connectors, this unit can support F_H= 31 ~ 57 KHz, Fv=56 ~ 70Hz and panel DCLK<= 85 MHz. SXGA display modes as below:

VESA MODES							
Mode	Resolution	Total	Horizontal		Vertical		Nominal Pixel Clock (MHz)
			Nominal Frequency +/-0.5KHz	Sync Polarity	Nominal Frequency +/-1Hz	Sync Polarity	
VGA	640*480@60Hz	800*525	31.469	N	59.941	N	25.175
SVGA	800*600@56Hz	1024*625	35.156	P	56.250	P	36.000
	800*600@60Hz	1056*628	37.879	P	60.317	P	40.000
XGA	1024*768@60Hz	1344*806	48.363	N	60.004	N	65.000
	1024*768@70Hz	1328*806	56.476	N	70.069	N	75.000
MAC MODES							
VGA	640*480@66.7Hz	864*525	35.000	P	66.667	P	30.240
Other MODES							
XGA	1024*768@66Hz	1318*809	53.414	N	66.025	N	70.400
WXGA+	1366*768@60Hz	1792*798	47.714	P	59.790	P	85.500

Note: 1. Non-interlace signals only (An interlace signal cannot be display)
2. Please refer to F/W specification for more detail
3. Each frequency of Power Macintosh and Sun Ultra is a reference value

4.2.2 DDC signals

DDC signals: 5V@50mA TTL level

4.3 Timing requirements

Scan Frequency	Condition	Specification
Horizontal	Sync polarity: (+) or (-)	31 ~ 57 KHz.
Vertical	Sync polarity: (+) or (-)	56-70Hz
Out of range	Excluding Horizontal 31~57 KHz or Vertical 56-70 Hz panel DCLK<= 85 MHz	Message “Input Not Supported” on screen

4.4DDC data

4.4.1 EDID Standard Compliance

EDID File Format : VESA’s EDID Standard Version #3, Revision #0,
EDID Structure : Version #1, Revision #3.
EDID Data Table : See the attached table (for example)

X163W EDID table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	58	00	5C	AA	80	80
1	08	12	01	03	08	23	14	78	E8	55	45	A3	55	4A	97	27
2	15	50	54	33	0C	00	61	46	01	01	01	01	01	01	01	01
3	01	01	01	01	01	01	8A	21	56	B0	51	00	1B	30	48	90
4	13	00	58	C1	10	00	00	1C	00	00	00	FD	00	38	46	1F
5	39	09	00	0A	20	20	20	20	20	20	00	00	00	FF	00	31
6	32	33	34	35	36	37	38	39	30	41	42	0A	00	00	00	FC
7	00	58	31	36	33	57	0A	20	20	20	20	20	20	20	00	43

X163W EDID table detail description:

Address	Vendor Product Identification	Description
00~07h	ID information Header	ID information Header
08~09h	ID Manufacturer Name	ACR
0A~0Bh	ID Product Code	0058
0C~0Fh	ID Serial Number	8080AA5C
10h	Week of Manufacture	08
11h	Year of Manufacture	2008
12h	Version Number	1
13h	Revision Number	3
14h	Analog/Digital Signal Level [7]	Analog Signal Level
	Signal Level Standard [6:5]	0.700, 0.300 (1.000Vp-p)
	Setup [4]	No Blank -to-black Setup

	Sync Inputs Supported [3]	Separate Syncs. Supported
	Sync Inputs Supported [2]	No Composite Sync. Supported
	Sync Inputs Supported [1]	No Sync. on Green Supported
	Sync Inputs Supported [0]	No Serration Required
15h	Max. Horizontal Image Size	35 cm
16h	Max. Vertical Image Size	20 cm
17h	Gamma	2.2
18h	VESA DPMS [7]	Standby
	VESA DPMS [6]	Suspend
	Display Off Consumption [5]	Active Off/Very Low Power
	Display Type [4:3]	RGB Color Display
	sRGB Standard Color Space [2]	No sRGB Color Space
	Preferred Timing Mode [1]	No Preferred Timing Mode
	GTF Standard [0]	No Default GTF Supported
19~22h	Red (x , y)	0.638, 0.333
	Green (x , y)	0.290, 0.591
	Blue (x , y)	0.153, 0.082
	White (x , y)	0.313, 0.329
23h	IBM, VGA [7]	720 x 400 @ 70Hz (N/A)
	IBM, XGA2 [6]	720 x 400 @ 88Hz (N/A)
	IBM, VGA [5]	640 x 480 @ 60Hz
	Apple, Mac II [4]	640 x 480 @ 67Hz
	VESA [3]	640 x 480 @ 72Hz (N/A)
	VESA [2]	640 x 480 @ 75Hz (N/A)
	VESA [1]	800 x 600 @ 56Hz
	VESA [0]	800 x 600 @ 60Hz
24h	VESA [7]	800 x 600 @ 72Hz (N/A)
	VESA [6]	800 x 600 @ 75Hz (N/A)
	Apple, MacII [5]	832 x 624 @ 75Hz (N/A)
	IBM [4]	1024 x 768 @ 87Hz(I) (N/A)
	VESA [3]	1024 x 768 @ 60Hz
	VESA [2]	1024 x 768 @ 70Hz
	VESA [1]	1024 x 768 @ 75Hz (N/A)
	VESA [0]	1280 x 1024 @ 75Hz (N/A)
25h	Apple, Mac II [7]	1152 x 870 @ 75Hz (N/A)

	VESA [6]	800 x 600 @ 85Hz (N/A)
	VESA [5]	1024 x 768 @ 85Hz (N/A)
	VESA [4]	1280 x 1024 @ 60Hz (N/A)
	VESA [3]	1280 x 1024 @ 85Hz (N/A)
	VESA [2]	1600 x 1024 @ 60Hz (N/A)
	VESA [1]	1600 x 1200 @ 75Hz (N/A)
	VESA [0]	1600 x 1200 @ 85Hz (N/A)
26~27h	Standard Timing Identification #1	1024 x 768 @ 66Hz 4: 3
28~29h	Standard Timing Identification #2	No Application
2A~2Bh	Standard Timing Identification #3	No Application
2C~2Dh	Standard Timing Identification #4	No Application
2E~2Fh	Standard Timing Identification #5	No Application
30~31h	Standard Timing Identification #6	No Application
32~33h	Standard Timing Identification #7	No Application
34~35h	Standard Timing Identification #8	No Application

36~46h	Pixel Clock	85.86 MHz
	Horizontal Active	1366 Pixels
	Horizontal Blanking	432 Pixels
	Vertical Active	768 Lines
	Vertical Blanking	27 Lines
	Horizontal Sync Offset	72 Pixels
	Horizontal Sync Pulse Width	144 Pixels
	Vertical Sync Offset	1 Lines

Vertical Sync Pulse Width	3 Lines
Horizontal Image Size	344 mm
Vertical Image Size	193 mm
Horizontal Border	0 Pixels
Vertical Border	0 Lines

Flags	Non-Interlaced
	Normal Display, No Stereo
	Digital Separate
	Vsync Positive Polarity
	Hsync Negative Polarity

48~59h	Min. Vertical Frequency	56 Hz
	Max. Vertical Frequency	70 Hz
	Min. Horizontal Frequency	31 kHz

	Max. Horizontal Frequency	57 kHz
	Max. Pixel Clock	90 MHz
5A~6Bh	Monitor Serial Number	1234567890AB
6C~7Dh	Monitor Name	X163W
7Eh	Extension Flag	00
7Fh	Checksum	43

5. Function Specifications

All the tests to verify specifications in this section shall be performed under the following standard conditions unless otherwise noted. The standard conditions are:

Temperature : 25 ± 5°C
Warm-up time : 30 minutes minimum
Checking display modes : All the specified modes

5.1 Panel general specifications

5.1.1 General specifications

Supplier	CMO			
Model name	M156B1_L01			
Display Area	344.232 x193.536 mm			
Pixel Pitch	0.252(H) x 0.252(V)			
Display Colors:	16.7 Million			
Number of Pixel	1366x768 pixels			
Pixel Arrangement	RGB vertical stripe			
Brightness	250cd/m^2(Typ.) 210cd/m^2 (Min.)			
Contrast Ratio	500:1 Typ. 350:1 Min.			
Viewing Angle	45(R),45(L),45(D),20(U) (Typ., CR>10)			
Display Mode	Normally White			
Frame rate	75Hz			
Response Time	Tr + Tf = 8ms Typ.			
Surface Treatment	Anti-glare, Haze = 25%, Hard coating (3H)			
Lamp	2 CCFL			
Outline Dimension	363.8(W)x215.9(H)x14.3(D) (Typ.)			

5.1.2 **LCD module defects**

LCD module defects check follow to the IIS.

5.2 Keypad Function

5.2.1 **Control buttons on the front bezel**

CONTROL KEY	KEYS FUNCTION
[AUTO]	A. When “main OSD” un-displays, press [AUTO] to perform “scenario OSD” ; B. When “scenario OSD” displays, press [AUTO] to perform auto-adjustment; C. When “main OSD” displays, press [AUTO] to return to previous level menu or exit “main OSD”.

[e]	A. When OSD un-displays, when press [e] the e-Color menu will show B. When OSD displays, when press [e] the e-Color menu will show, OSD will disappear
[MENU]	A. When "main OSD" isn't shown on screen, press [MENU] to enter "main OSD" interface; B. When "main OSD" and displays, press [MENU] to perform function of menu icon that is highlight or enter next level menu.
[►], [◄]	When "main OSD" and "scenario OSD" displays, press these keys to change the contents of an adjustment item, or change an adjustment value
[POWER]	Power on or power off the monitor

5.2.2 Hot Key Operation

FUNCTION	HOT KEY OPERATION					DESCRIPTION
	e	◄	►	MENU	POWER	
FACTORY MODE	●			●	ON	Press [e] & [MENU] at the same time, and then press [POWER] for DC power on. OSD menu will be shown with "F" on the left top. Select "F" for entering factory mode.

5.3 OSD Structure

The On-Screen Display (OSD) shall be an easy to use icon based menu through keypad OSD buttons or remote control unit. The unit shall leave the factory with all OSD controls set to their default values.

First	Second		Third	Control Range	Default Value	
Brightness	Contrast		---	0 ~ 100	User mode	50
					Text mode	50
					Standard mode	50
					Graphics mode	60
					Movie mode	56
	Brightness		---	0 ~ 100	User mode	77
					Text mode	44
					Standard mode	77
					Graphics mode	97
					Movie mode	77
Image	Focus		---	0 ~ 100	Depend on each timing	
	Clock		---	0 ~ 100	50	
Position	Horizontal		---	0 ~ 100	50	
	Vertical		---	0 ~ 100	Depend on each timing	
Color	Warm (6500K)		---	---		
	Cool (9300K)		---	---		
	User		Red	0 ~ 100	80	
			Green	0 ~ 100	80	
			Blue	0 ~ 100	80	
Language	**NO-EMEA**	**EMEA**				
	English	English	---	---	English	

	Deutsch	Deutsch	---	---	
	Español	Español	---	---	
	简体中文	Hollands	---	---	
	繁體中文	Русский	---	---	
	Français	Français	---	---	
	Italiano	Italiano	---	---	
	日本語	Suomalainen	---	---	
OSD	Hor. Position		---	0 ~ 100	50
	Ver. Position		---	0 ~ 100	50
	OSD Timeout		---	10~ 120	20
Input	Analog		---	---	---
	Digital		---	---	---
Info	Resolution		---	---	---
	H. Freq		---	---	---
	V. Freq		---	---	---
Reset	---		---	---	---
Exit	---		---	---	---

Notes; ф Clock default 50 is for Visa timing. Others depend on timing.

8.0 SOP of firmware upgrade

8.1 Operational condition:

Equipment: PC, ISP card, signal cable and power cable.

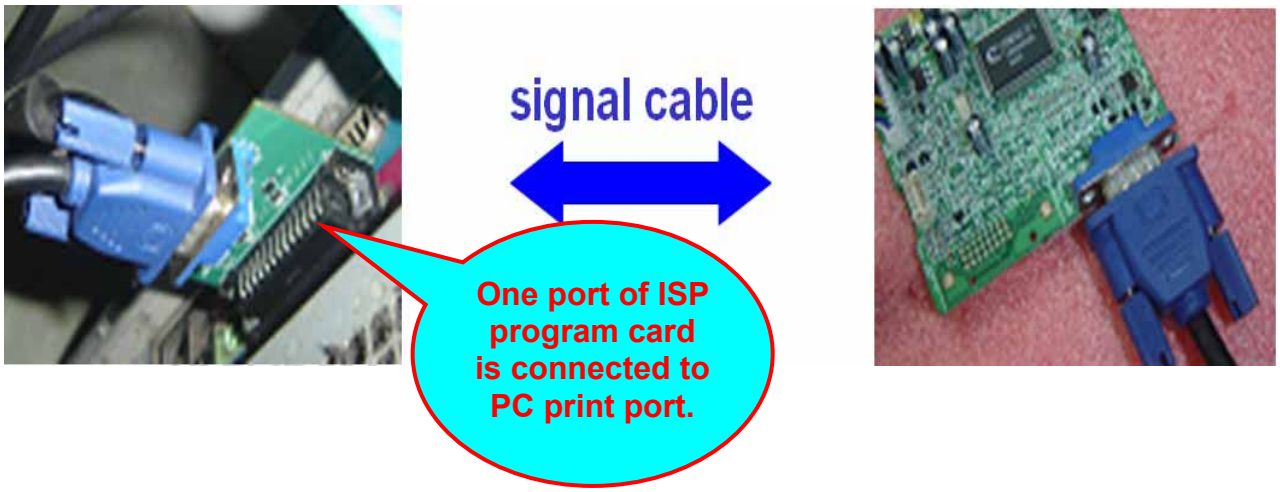
ESD requirements: antistatic wrists, antistatic gloves (fingers), and connecting cable

Name of ISP program: **ISP_Tool_v3.7.5.3**

Manufacture of FW IC：**PMC/SST/MX**

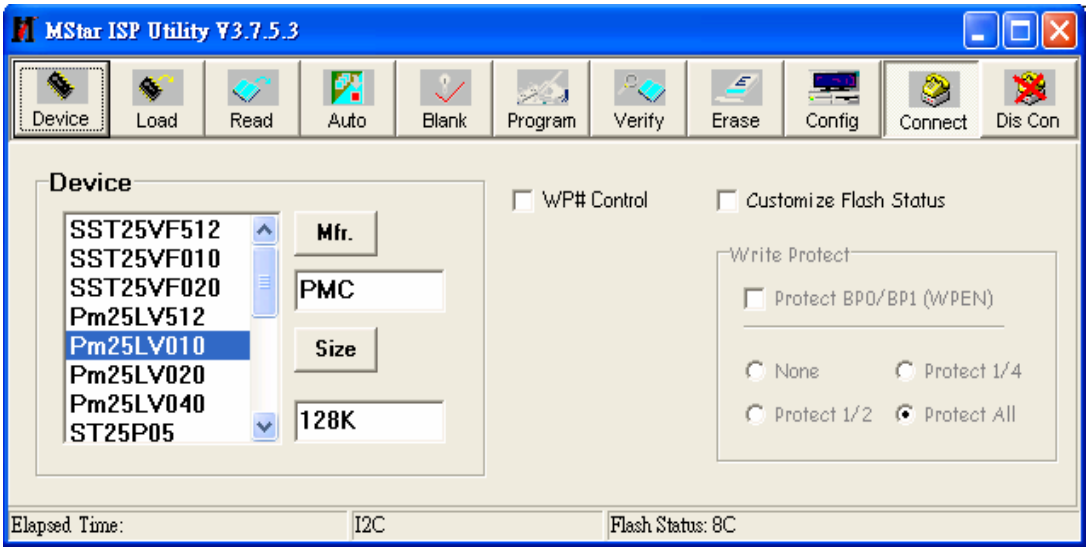
8.2 Operational steps:

1. Connection: connect PC to PCBA with signal cable, and then keep AC and DC in open state.

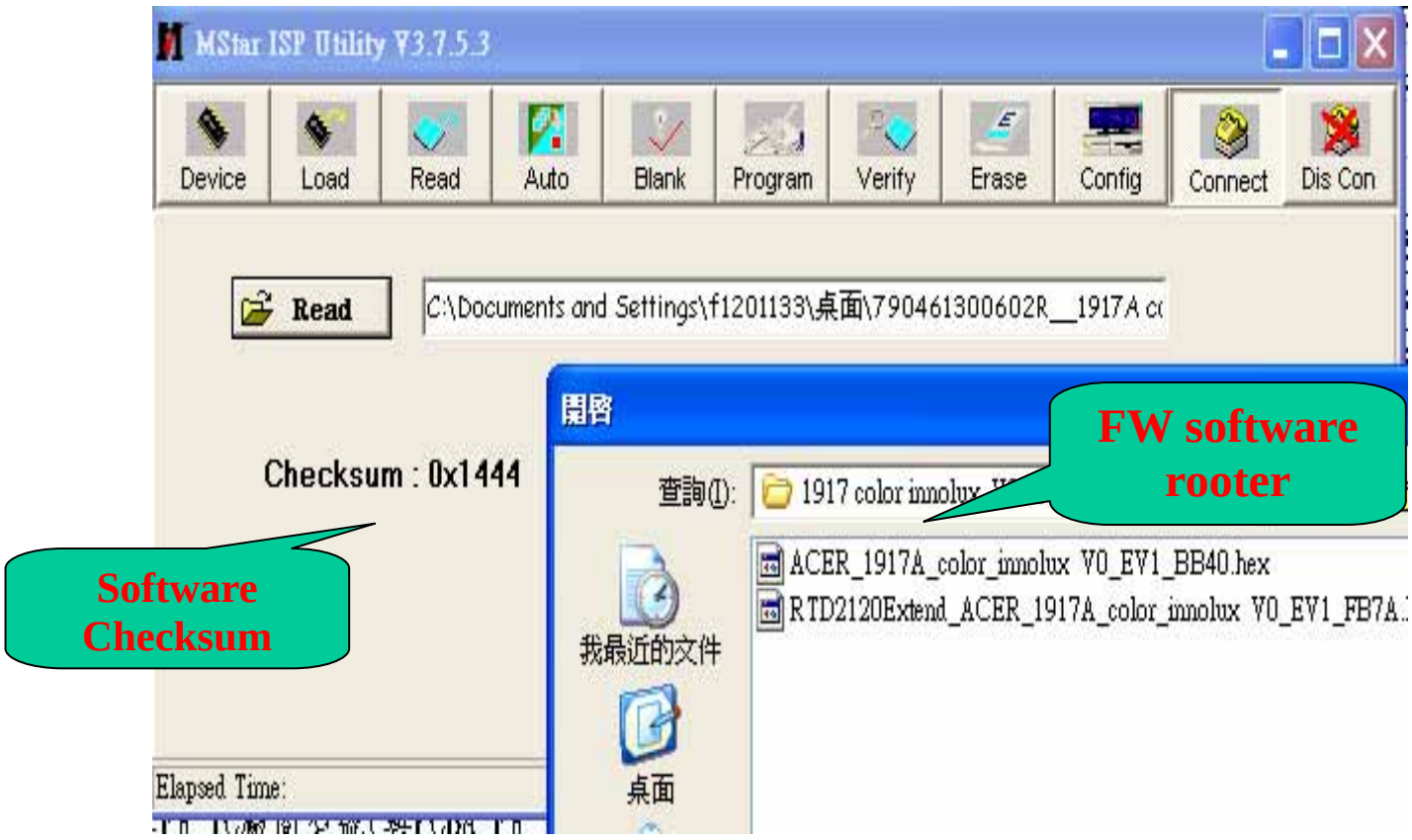


2. Adjust ISP programming

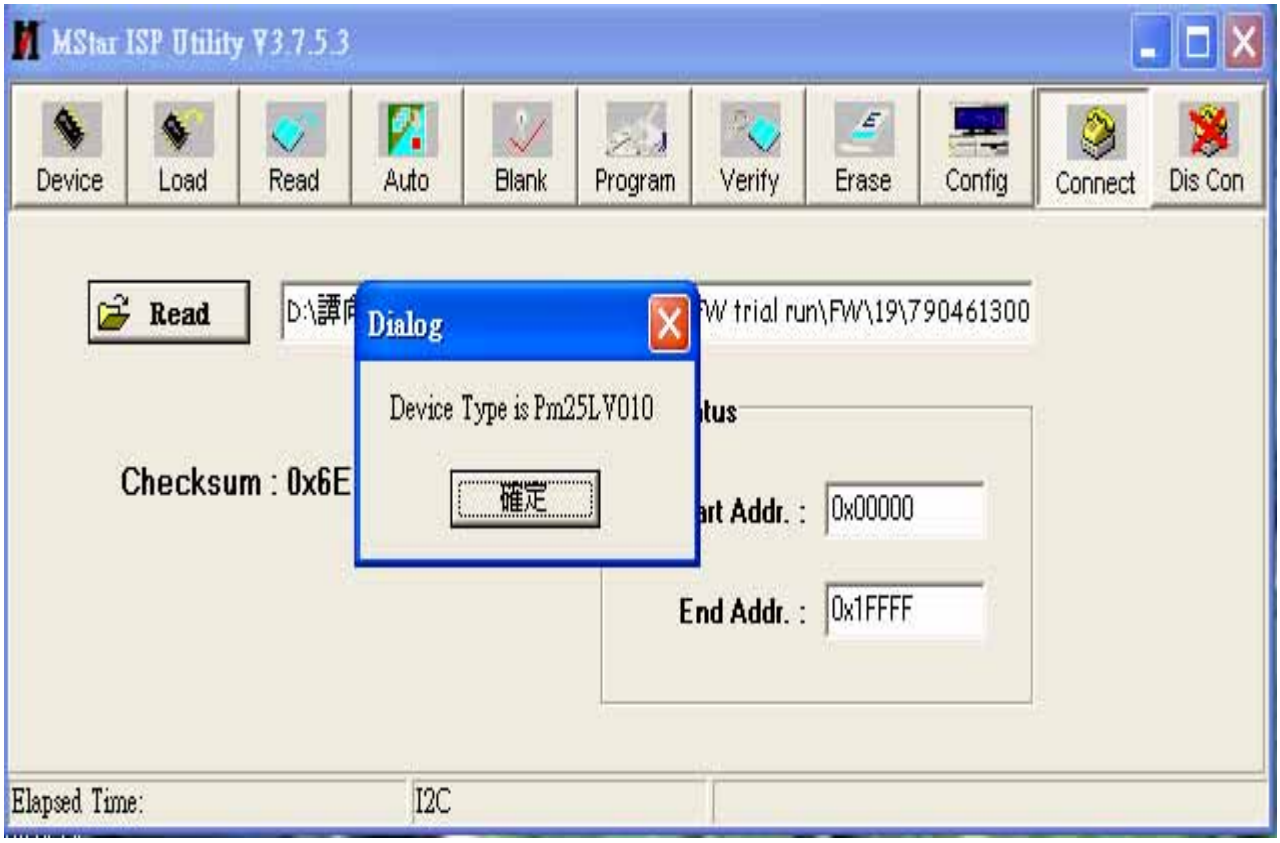
Firstly, double click ISP_Tool_v3.7.5EXEI and open ISP program, then select “Device”, next select manufacturer model of FW IC, which should be correspondent with that of PCBA FW IC. Double click Figure One.



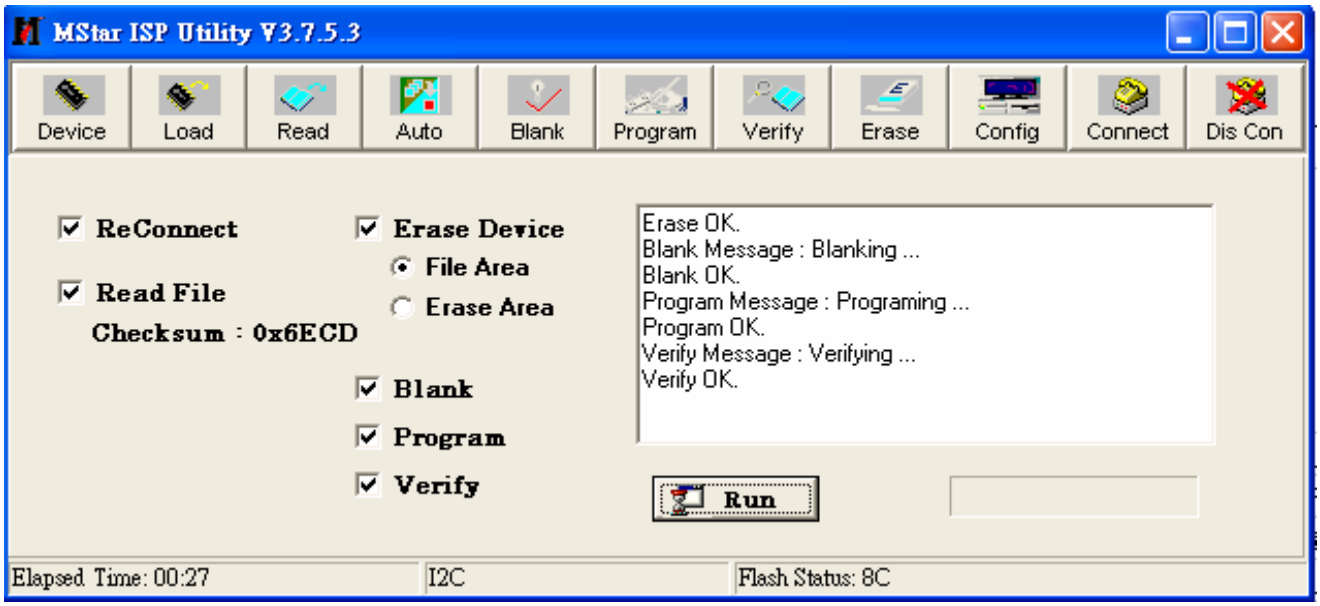
Secondly ,download FW software: first select “READ”, and then load FW software in Rooter (Fig.2).



Thirdly, select “Connect” and enter ISP MODE as in the following Figure 3.

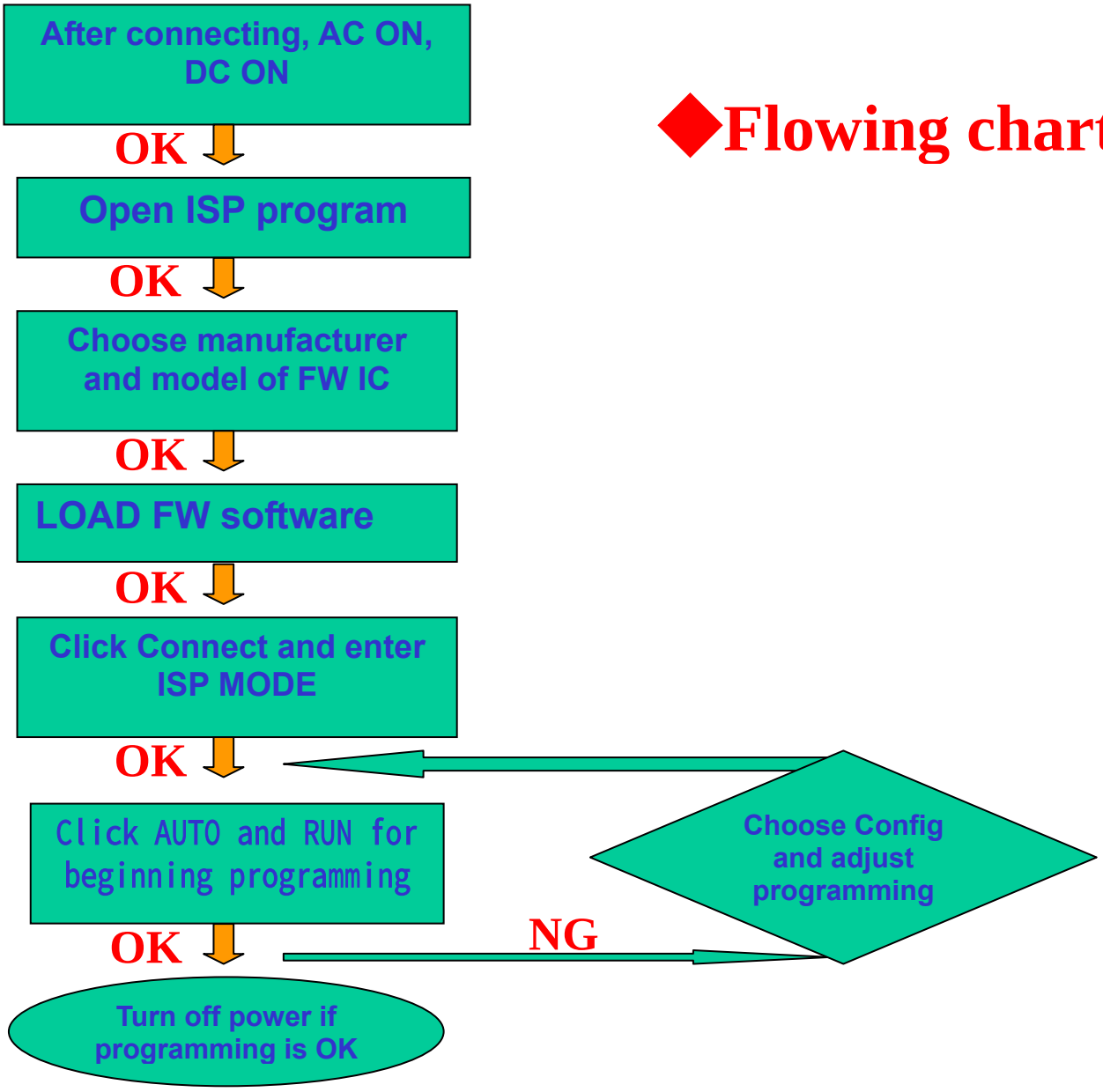


Fourthly, select “AUTO”, and keep its default value. Click “RUN” for beginning programming. There will be prompting if programming is OK.



Note: if programming fails or success rate is not high, click “Config” and adjust its speed in “E2PROM DEVICE SETTING”

◆Flowing chart



02. Flat Panel Specification

1. GENERAL DESCRIPTION

1.1 OVERVIEW

M156B1-L01 is a 15.6" TFT Liquid Crystal Display module with 2 CCFL Backlight unit and 30pin 1ch-LVDS interface. This module supports 1366 x 768 WXGA mode and can display up to 16.7M colors. The inverter module for Backlight is not built in.

1.2 FEATURES

- Contrast ratio 500:1
- Response time 8ms.
- Brightness 250nits
- Color saturation NTSC 65%.
- WXGA (1366 x 768 pixels) resolution.
- DE (Data Enable) only mode.
- LVDS (Low Voltage Differential Signaling) interface.
- RoHS compliance.

1.3 APPLICATION

- TFT LCD Monitor

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	344.232(H) × 193.536(V) (15.6" diagonal)	mm	(1)
Bezel Opening Area	347.5(H)x196.8(V)	mm	
Driver Element	a-Si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.252 (H) x 0.252 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Transmissive Mode	Normally White	-	-
Surface Treatment	AG type, 3H hard coating, Haze 25	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	363.3	363.8	364.3	mm	(1)
	Vertical(V)	215.4	215.9	216.4	mm	
	Depth(D)	13.8	14.3	14.8	mm	
Weight		-		1300	g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

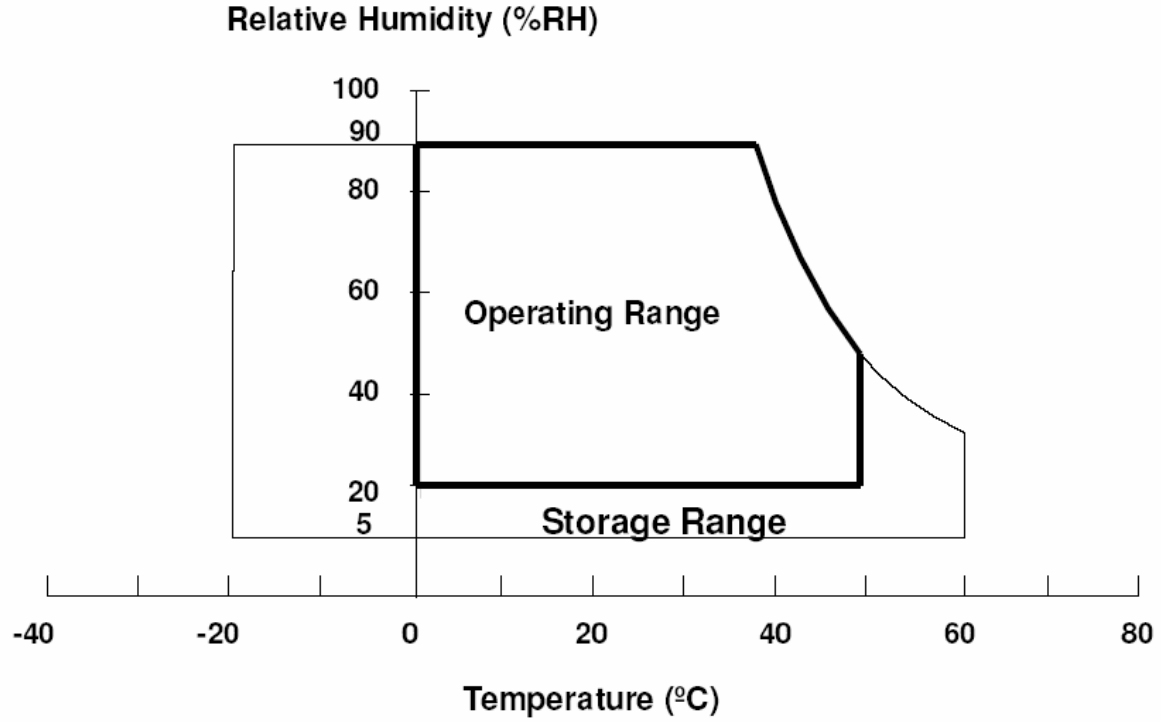
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.

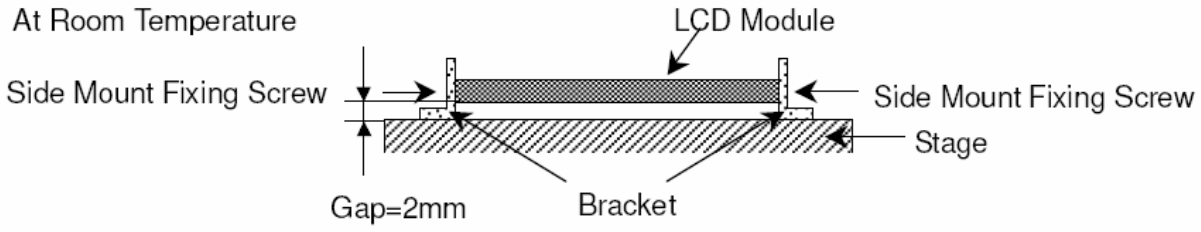


Note (3) 11ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

The fixing condition is shown as below:



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	+6.0	V	(1)

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V_L		2.5K	V_{RMS}	(1), (2)
Lamp Current	I_L	3	8	mA_{RMS}	(1), (2) also see page.10
Lamp Frequency	F_L	50	60	KHz	Note(7)

Note (1) Permanent damage might occur if the module is operated at conditions exceeding the maximum values.

Note (2) Specified values are for lamp (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

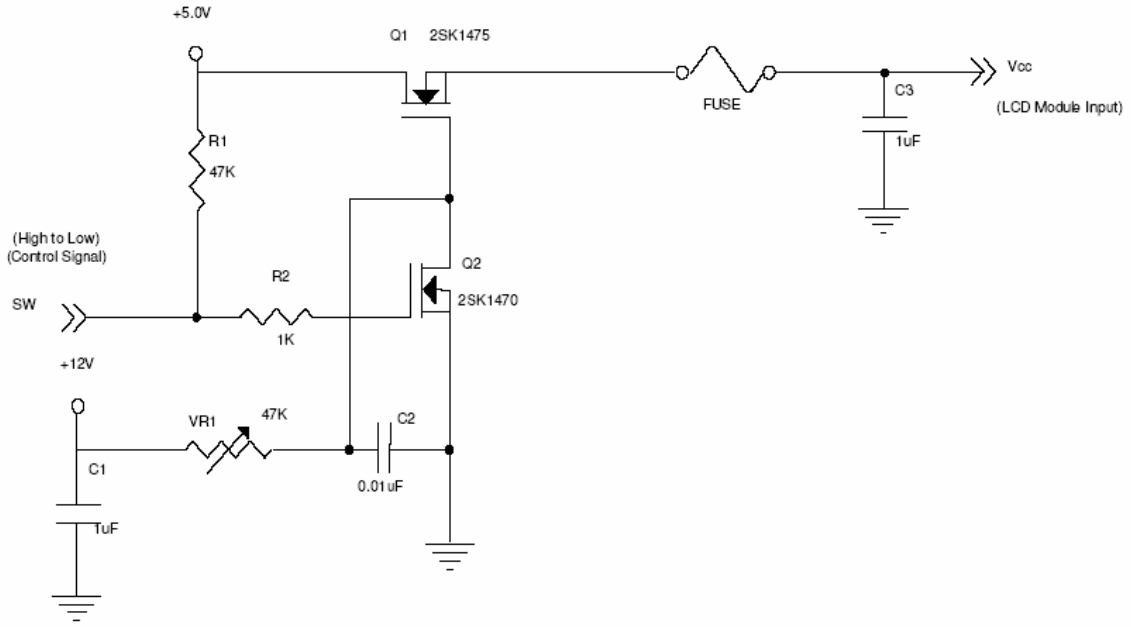
3.1.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

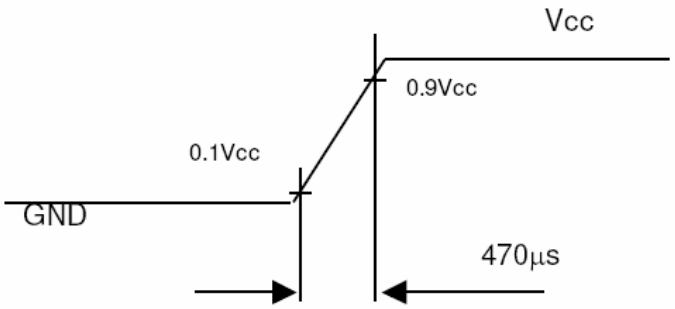
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	4.5	5.0	5.5	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}			1.5	A	(2)
Power Supply Current	White	-		0.3	0.35	A	(3)a
	Black	-		0.35	0.41	A	(3)b
	Vertical Stripe	-		0.4	0.45	A	(3)c
LVDS differential input voltage		Vid	100	-	600	mV	
LVDS common input voltage		Vic	-	1.2	-	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470μs



Note (3) The specified power supply current is under the conditions at Vcc = 5.0 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

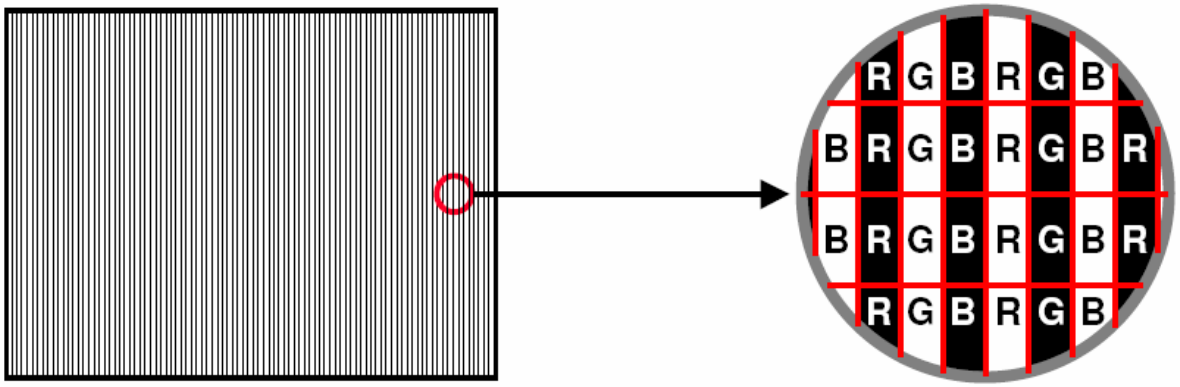
a. White Pattern

Active Area

b. Black Pattern

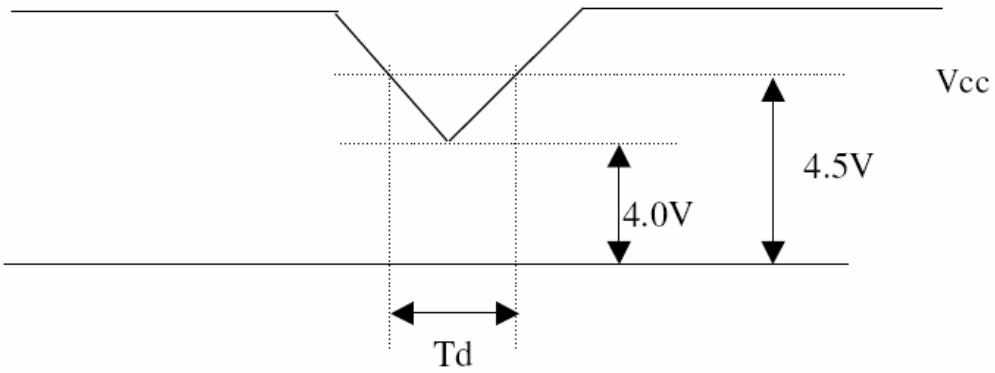
Active Area

c. Vertical Stripe Pattern



Active Area

3.1.2 Vcc Power Dip Condition:



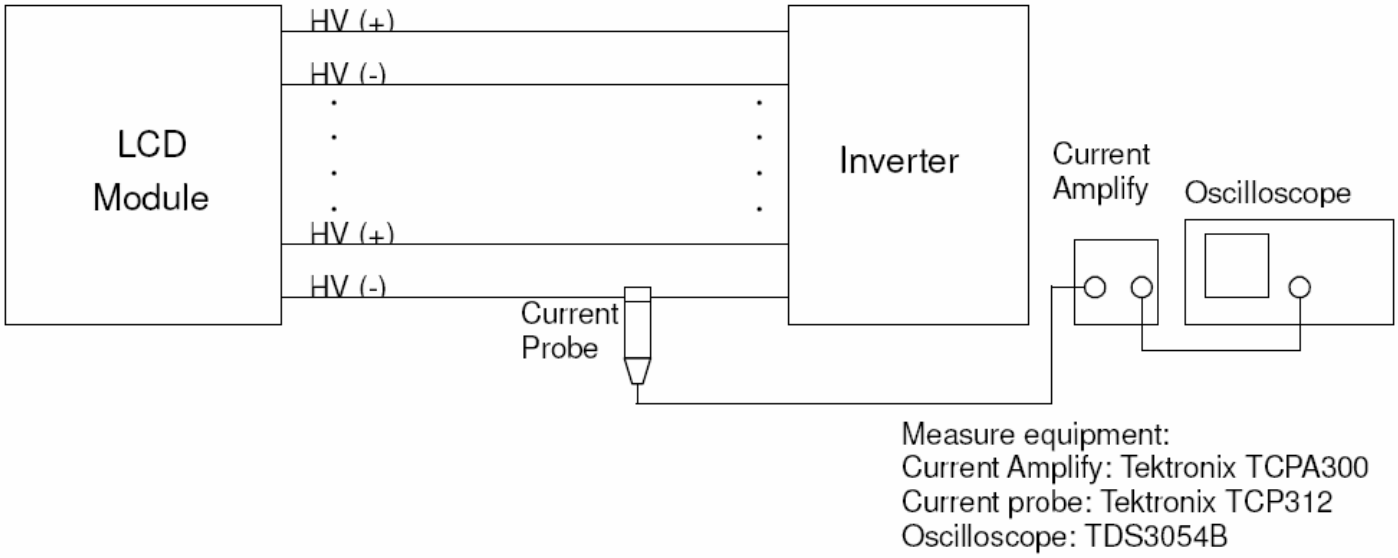
Dip condition: $4.0V \le Vcc \le 4.5V, Td \le 20ms$

3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	585	650	715	V_{RMS}	I_L = 7.0 mA
Lamp Current	I_L	3.0	7.0	8.0	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S			1200 (0℃)	V_{RMS}	(2)
				1100 (25℃)	V_{RMS}	(2)
Operating Frequency	F_L	50	55	60	KHz	(3)(7)
Lamp Life Time	L_{BL}	40,000	50,000		Hrs	(5), I_L = 7.0mA
Power Consumption	P_L		9.24		W	(4), I_L = 7.0 mA

Note (1) Lamp current is measured by current amplify & oscilloscope as shown below:



Note (2) The voltage that must be larger than Vs should be applied to the lamp for more than 1 second after startup. Otherwise, the lamp may not be turned on normally.

Note (3) The lamp frequency may produce interference with horizontal synchronization frequency from the display, which might cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronization frequency and its harmonics as far as possible.

Note (4) $P_L = I_L \times V_L \times 2$ (for 2 lamps)

Note (5) The lifetime of lamp can be defined as the time in which it continues to operate under the condition Ta = 25 ±2 °C and I_L = 7.0 mArms until one of the following events occurs:

(a) When the brightness becomes ≤ 50% of its original value.

(b) Effective lighting length decreases 80% under for initial. (Effective lighting length is a scope of luminance 80% over for average luminance at several point in lamp center.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the

inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

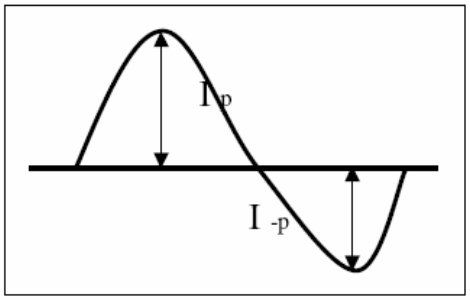
The output of the inverter must have symmetrical (negative and positive) voltage waveform and symmetrical current waveform.(Unsymmetrical ratio is less than 10%) Please do not use the inverter which has unsymmetrical voltage and unsymmetrical current and spike wave. Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.

Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp. It shall help increase the lamp lifetime and reduce its leakage current.

a. The asymmetry rate of the inverter waveform should be 10% below;

b. The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$;

c. The ideal sine wave form shall be symmetric in positive and negative polarities



* Asymmetry rate:

$$| I_p - I_{-p} | / I_{rms} * 100\%$$

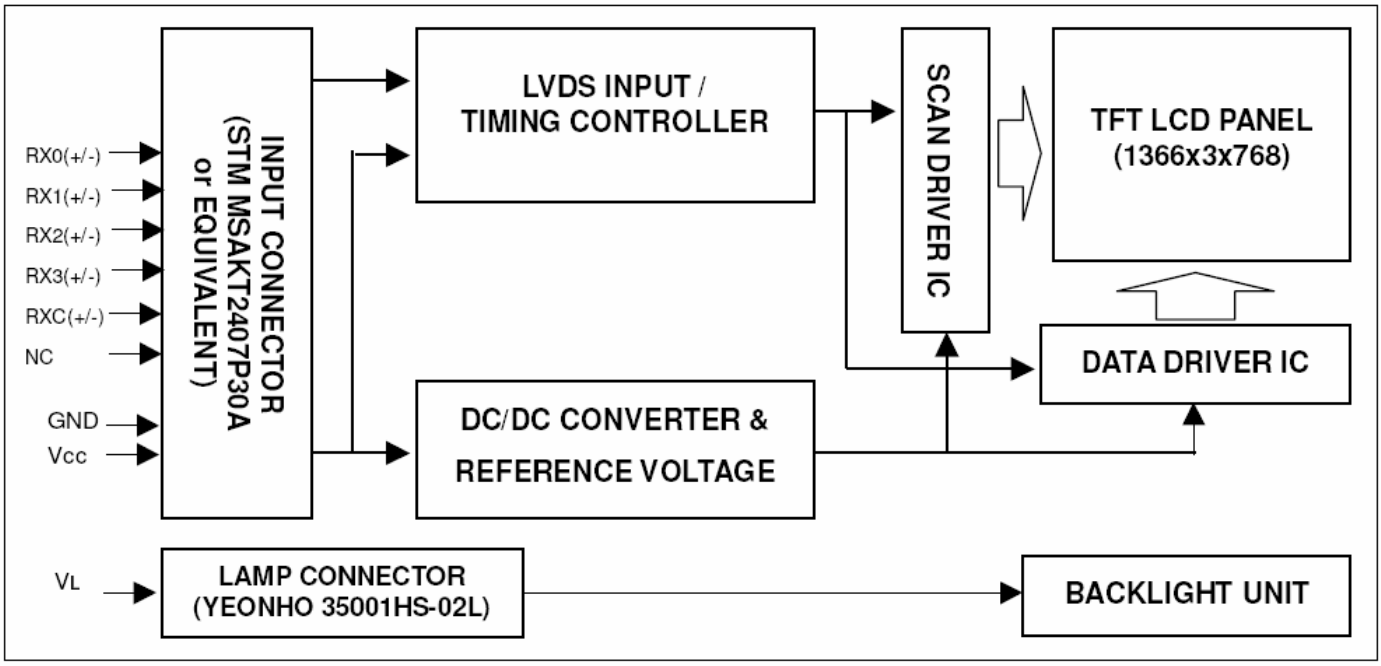
* Distortion rate

$$I_p \text{ (or } I_{-p}) / I_{rms}$$

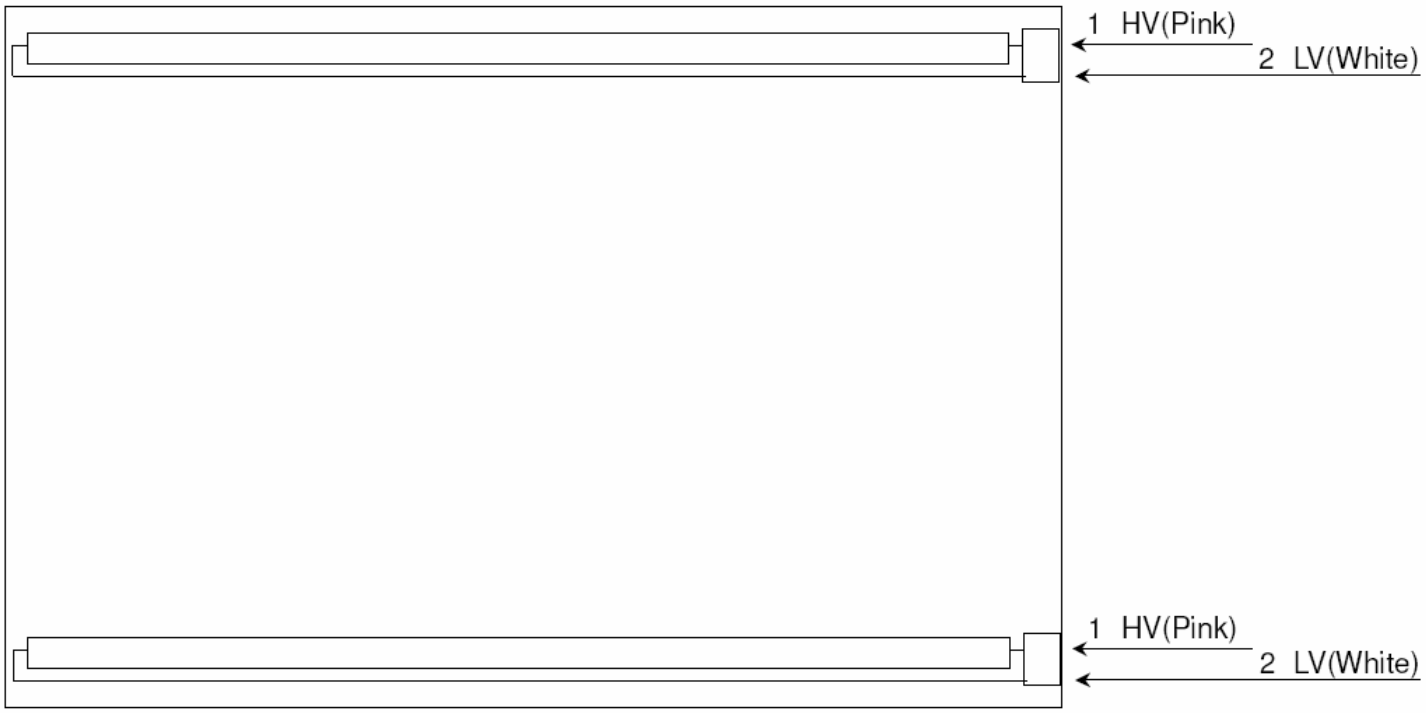
Note (7) 50~60KHz, the frequency range can guarantee the optical and electrical characteristics; 40~80KHz the frequency range will not effect the Lifetime and reliability characteristics.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Name	Description
1	NC	Not connection, this pin should be open.
2	NC	Not connection, this pin should be open.
3	NC	Not connection, this pin should be open.
4	GND	Ground
5	RX0-	Negative LVDS differential data input. Channel 0
6	RX0+	Positive LVDS differential data input. Channel 0
7	GND	Ground
8	RX1-	Negative LVDS differential data input. Channel 1
9	RX1+	Positive LVDS differential data input. Channel 1
10	GND	Ground
11	RX2-	Negative LVDS differential data input. Channel 2
12	RX2+	Positive LVDS differential data input. Channel 2
13	GND	Ground
14	RXCLK-	Negative LVDS differential clock input.
15	RXCLK+	Positive LVDS differential clock input.
16	GND	Ground
17	RX3-	Negative LVDS differential data input. Channel 3
18	RX3+	Positive LVDS differential data input. Channel 3
19	GND	Ground
20	NC	Not connection, this pin should be open.
21	NC	Not connection, this pin should be open.
22	NC	Reserved. (For internal test used)
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	Vcc	+5.0V power supply
27	Vcc	+5.0V power supply
28	Vcc	+5.0V power supply
29	Vcc	+5.0V power supply
30	Vcc	+5.0V power supply

Note (1) Connector Part No.: STM MSAKT2407P30A or equivalent

5.2 LVDS mapping table

LVDS Channel 0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	G0	R5	R4	R3	R2	R1	R0
LVDS Channel 1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	B1	B0	G5	G4	G3	G2	G1
LVDS Channel 2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	B5	B4	B3	B2
LVDS Channel 3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	B7	B6	G7	G6	R7	R6

5.3 BACKLIGHT UNIT:

Pin	Symbol	Description	Remark
1	HV	High Voltage	Pink
2	LV	Low Voltage	White

Note (1) Connector Part No.: YEONHO 35001HS-02L or equivalent

5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

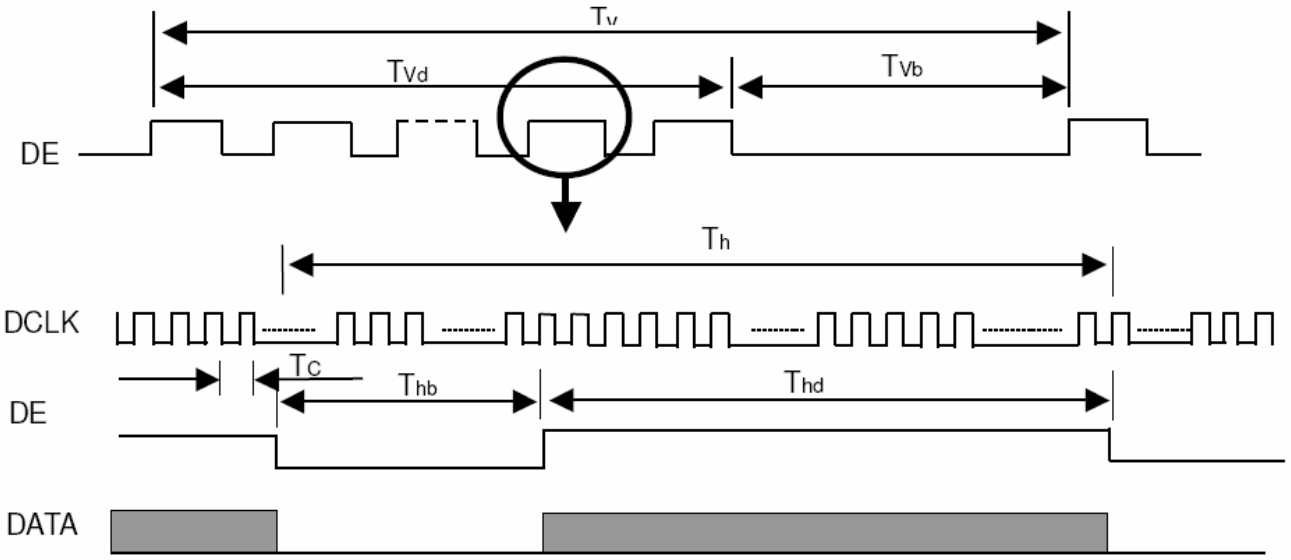
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	50.0	76	85	MHz	-
	Period	Tc	-	13.0	-	ns	
	High Time	Tch	-	4/7	-	Tc	-
	Low Time	Tcl	-	3/7	-	Tc	-
LVDS Data	Setup Time	Tlvs	600	-	-	ps	-
	Hold Time	Tlvh	600	-	-	ps	-
Vertical Active Display Term	Frame Rate	Fr	40	60	76	Hz	Tv=Tvd+Tvb
	Total	Tv	778	806	888	Th	-
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	Th	-
Horizontal Active Display Term	Total	Th	1446	1560	1936	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	Th-Thd	194	Th-Thd	Tc	-

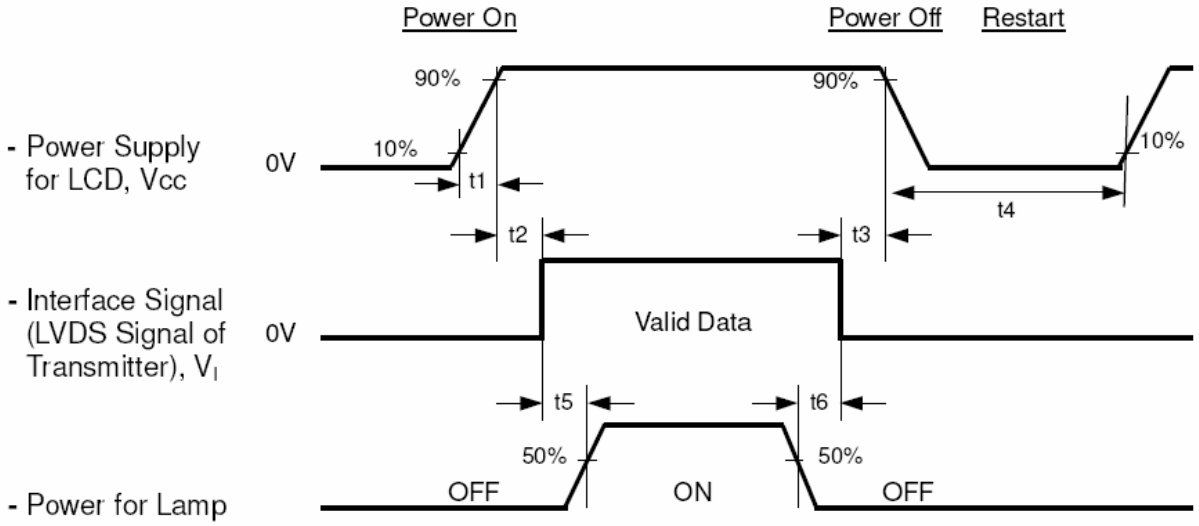
Note: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Timing Specifications:

0.5< t1 ≦ 10 msec

0 < t2 ≦ 50 msec

0 < t3 ≦ 50 msec

t4 ≧ 500 msec

t5 ≧ 450 msec

t6 ≧ 90 msec

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

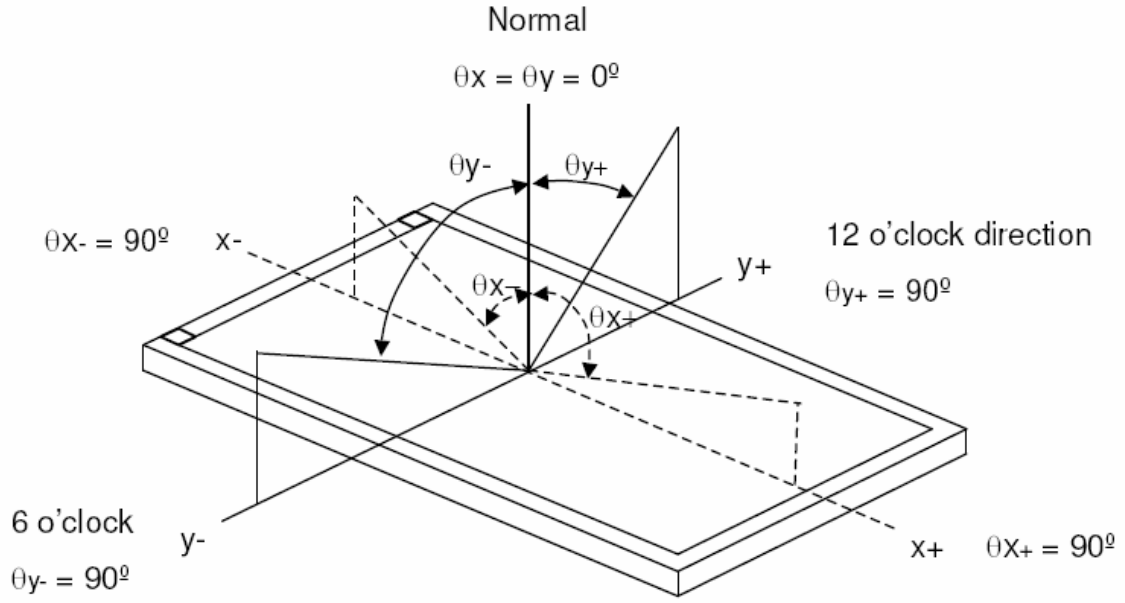
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5V	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I_L	7.0	mA
Inverter Operating Frequency	F_L	55±5	KHz
Inverter	Darfon VK12164.101		

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	θ_X=0°, θ_Y=0° CS-1000T	Typ - 0.03	0.638	Typ + 0.03	-	(1), (5)
		Ry			0.333			
	Green	Gx			0.290			
		Gy			0.591			
	Blue	Bx			0.153			
		By			0.082			
	White	Wx		0.283	0.313	0.343		
		Wy		0.299	0.329	0.359		
Center Luminance of White (Center of Screen)		L_C		210	250	-	cd/m^2	(4), (5)
Contrast Ratio		CR		350	500	-	-	(2), (5)
Response Time		T_R	θ_X=0°, θ_Y=0°	-	2	4	ms	(3), (7)
		T_F		-	6	12		
		$T_{GtG\ AVE}$		-	-			
White Variation		δW	θ_X=0°, θ_Y=0° USB2000	-	1.4	1.5	-	(5), (6)
Viewing Angle	Horizontal	θ_X+	CR ≧ 5 BM5A	50	55	-	Deg.	(1), (5)
		θ_X-		50	55	-		
	Vertical	θ_Y+		25	30	-		
		θ_Y-		50	55	-		
Viewing Angle	Horizontal	θ_X+	CR ≧ 10 BM5A	40	45	-	Deg.	(1), (5)
		θ_X-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		

Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

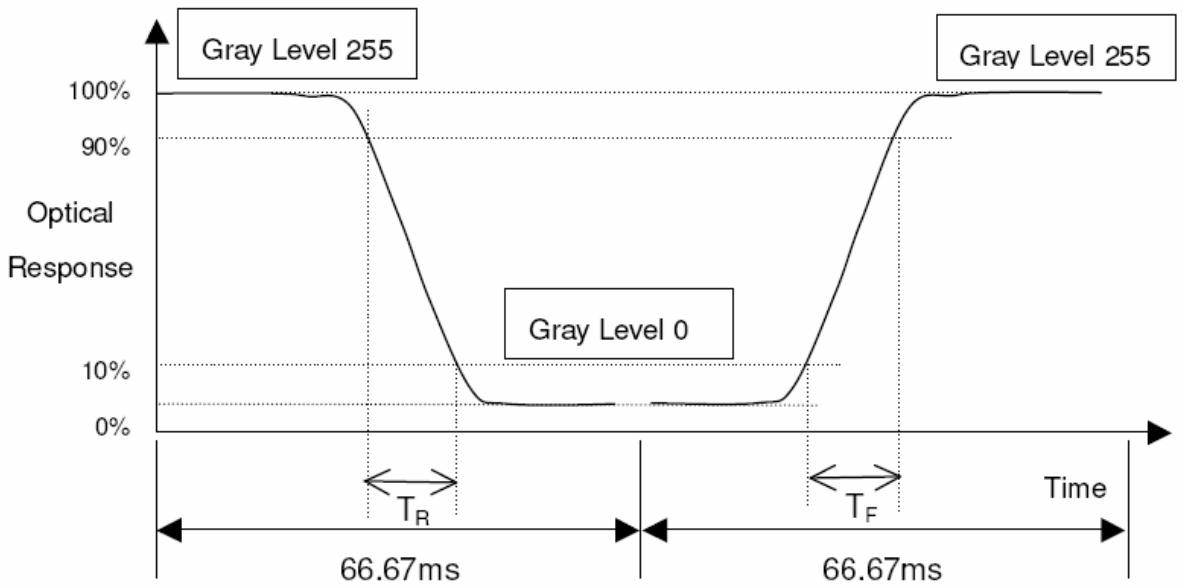
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (1)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Definition of Luminance of White (L_C):

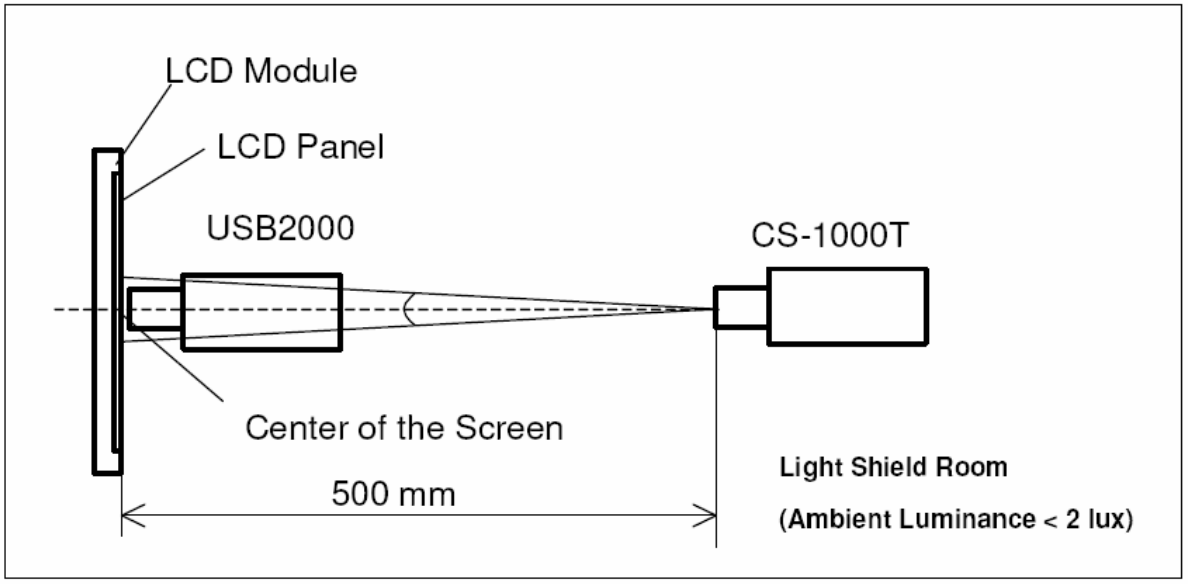
Measure the luminance of gray level 255 at center point

L_C = L (1)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

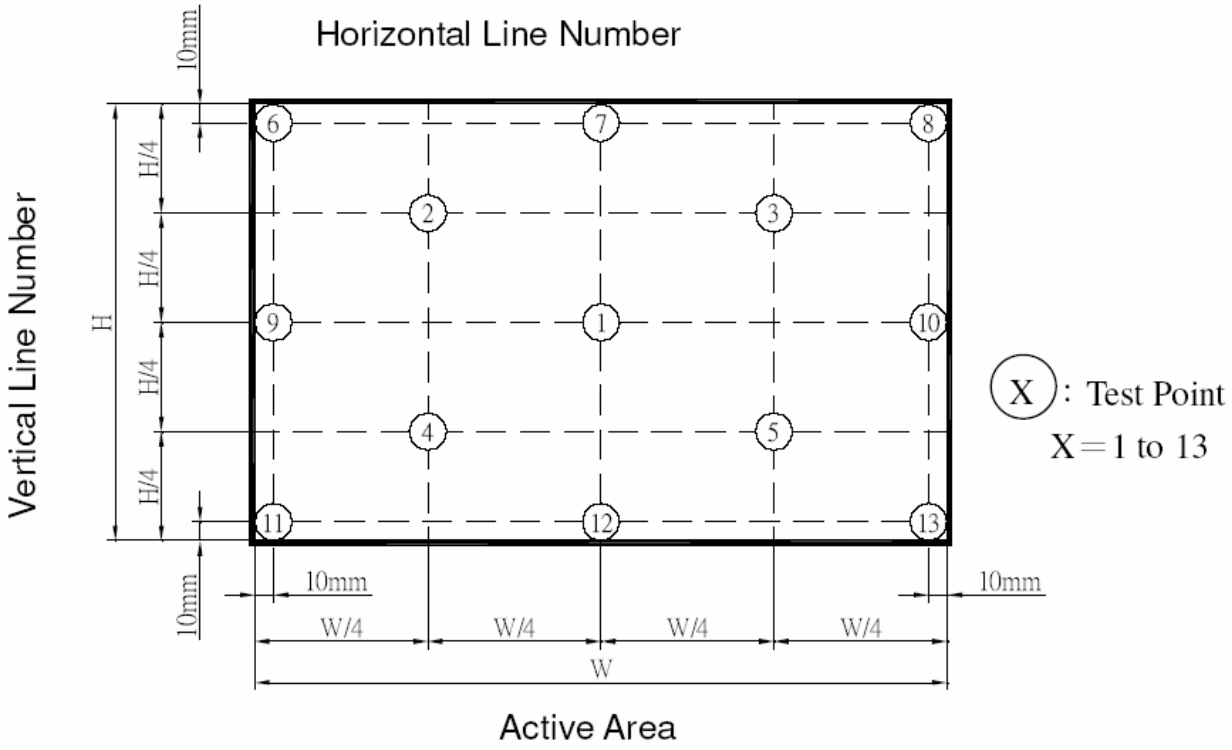
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 13 points

$$\delta W = \frac{\text{Maximum [L(1), L(2), L(3), L(4), L(5), L(6), L(7), L(8), L(9), L(10), L(11), L(12), L(13)]}}{\text{Minimum [L(1), L(2), L(3), L(4), L(5), L(6), L(7), L(8), L(9), L(10), L(11), L(12), L(13)]}}$$



Note (7) Definition of Response Time (T_{GTG_AVE}):

T_{GTG_AVE} is defined as the total average response time for "Gray To Gray ".

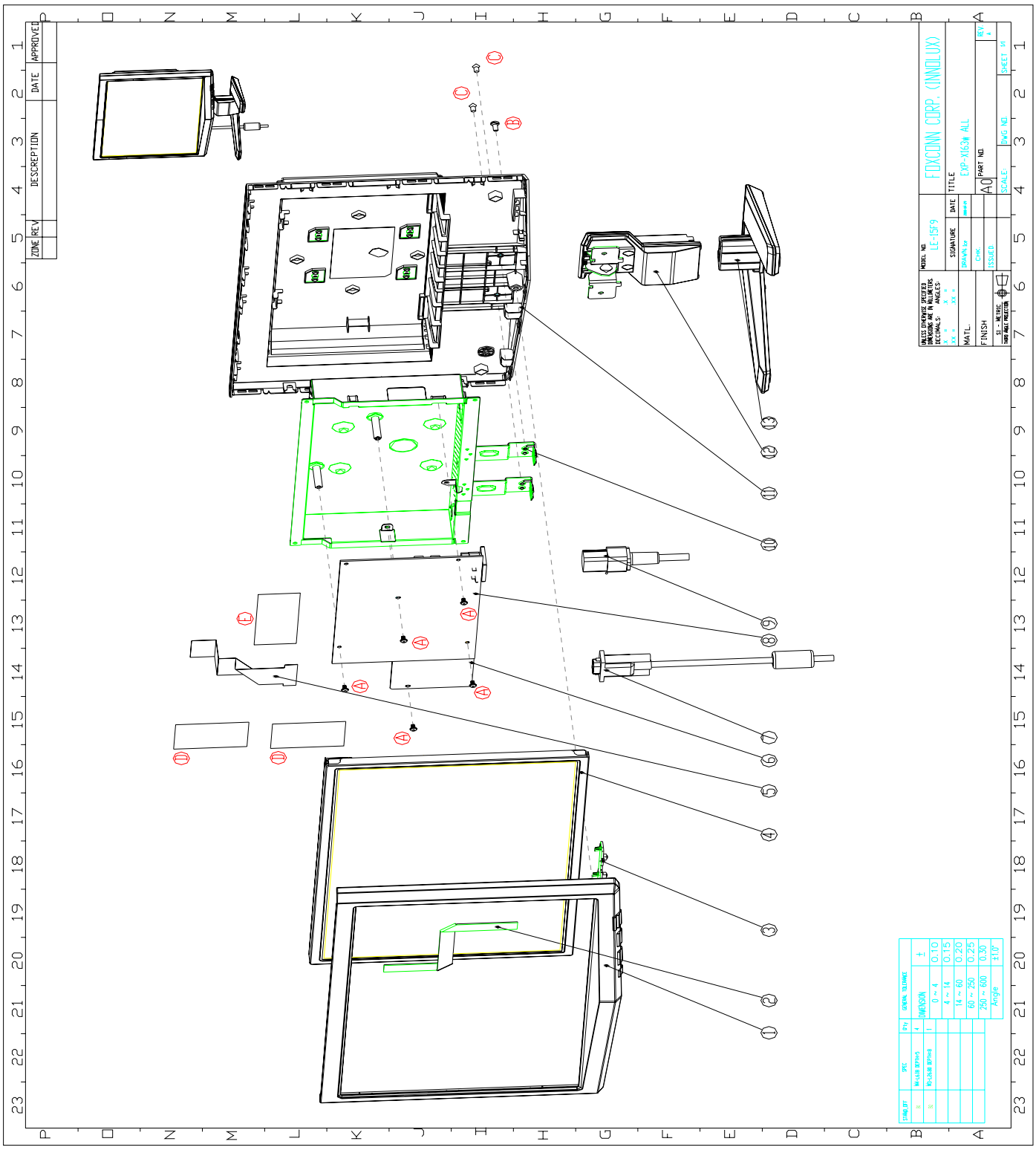
The Gray to Gray response time is defined as the following chart.

Gray to Gray		Target Gray								
		G0	G32	G64	G96	G128	G160	G192	G224	G255
Initial Gray	G0									
	G32									
	G64									
	G96									
	G128									
	G160									
	G192									
	G224									
	G255									

03 Exploded Diagram

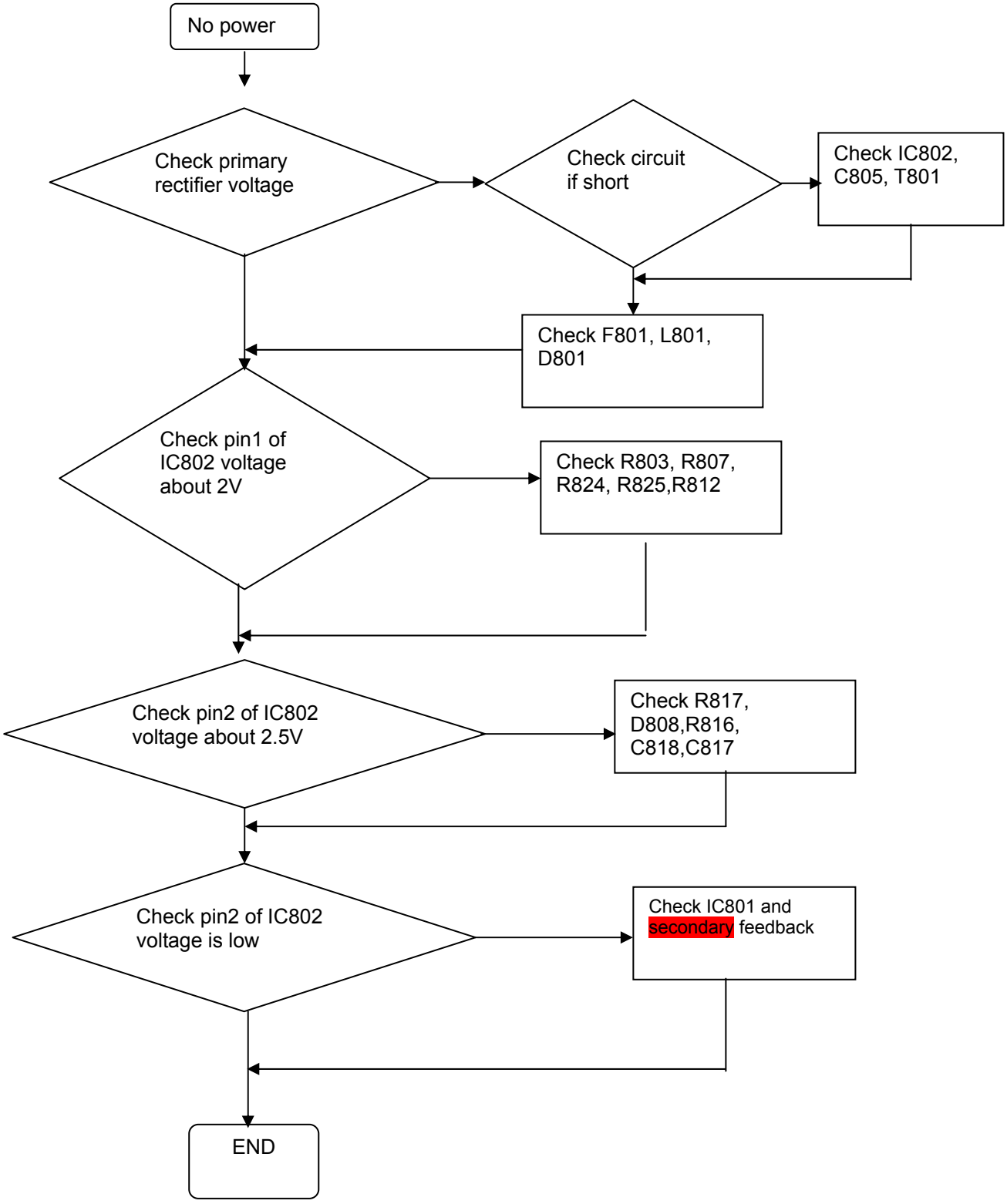
3.1. LCD Exploded drawing (All)

No	S/N	Description	Q'ty/ set	Unit	Torque	Remark
1	509146306200R	SCREW,P,CROSS,W/WAS,M3*6,Zn-Cc	5	pcs	3.75±0.25	FOR PCB&CHASSIS
2	509000000700R	BOLT,#4-40x11.8,Ni	2	pcs	3.5~4.0	for VGA
3	509412610500R	SCREW,B,CROSS,T.T-4*10,BLK ,ROHS	1	pcs	6.0~7.0	FOR Bezel AND BACKCOVER
4	509216608110R	SCREW,F,CROSS,M4*8,ZN ROHS(NYLOK,35F)	4	pcs	11.0±1.0	HINGE ASSY TO CHASSIS*4

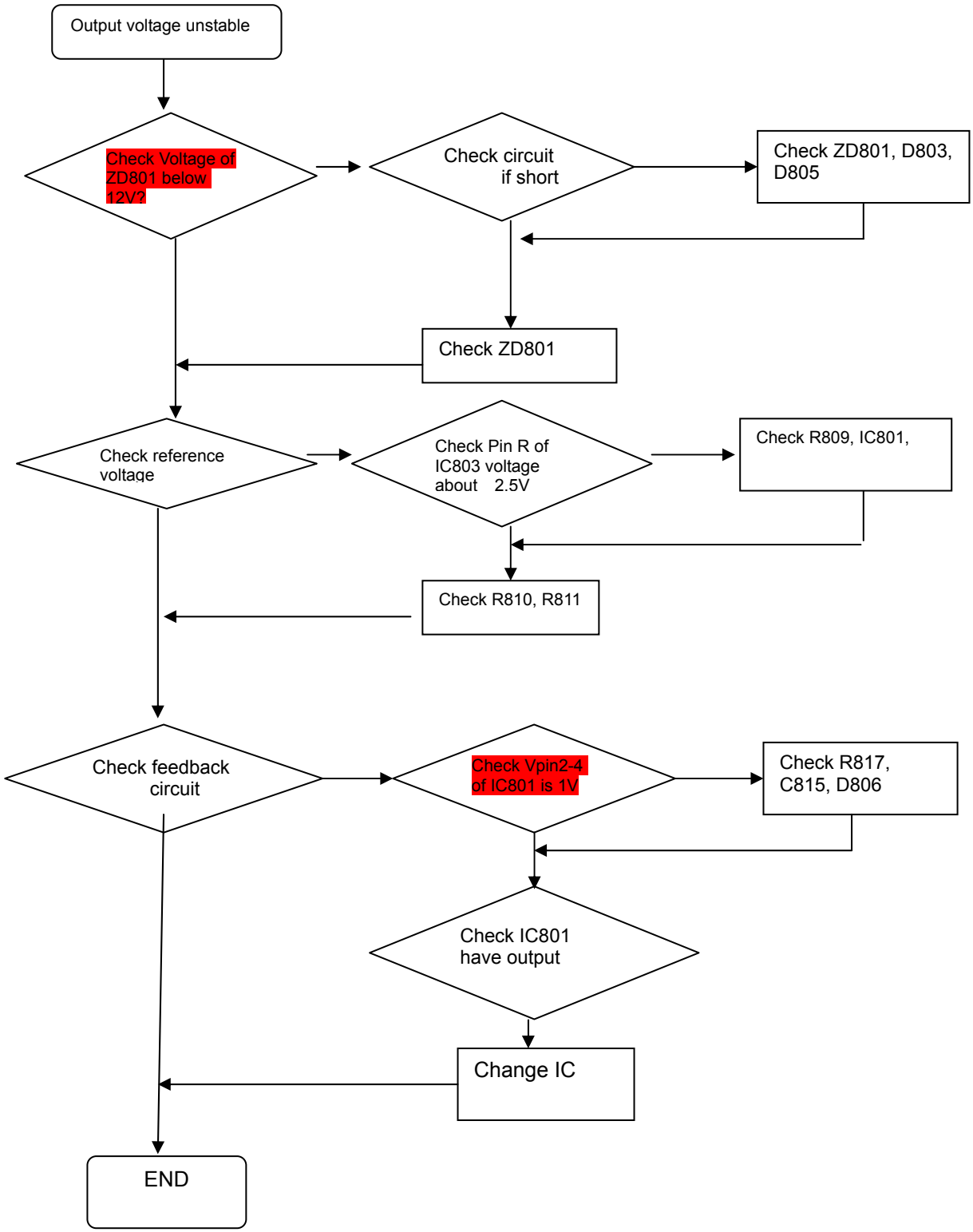


04 Troubleshooting

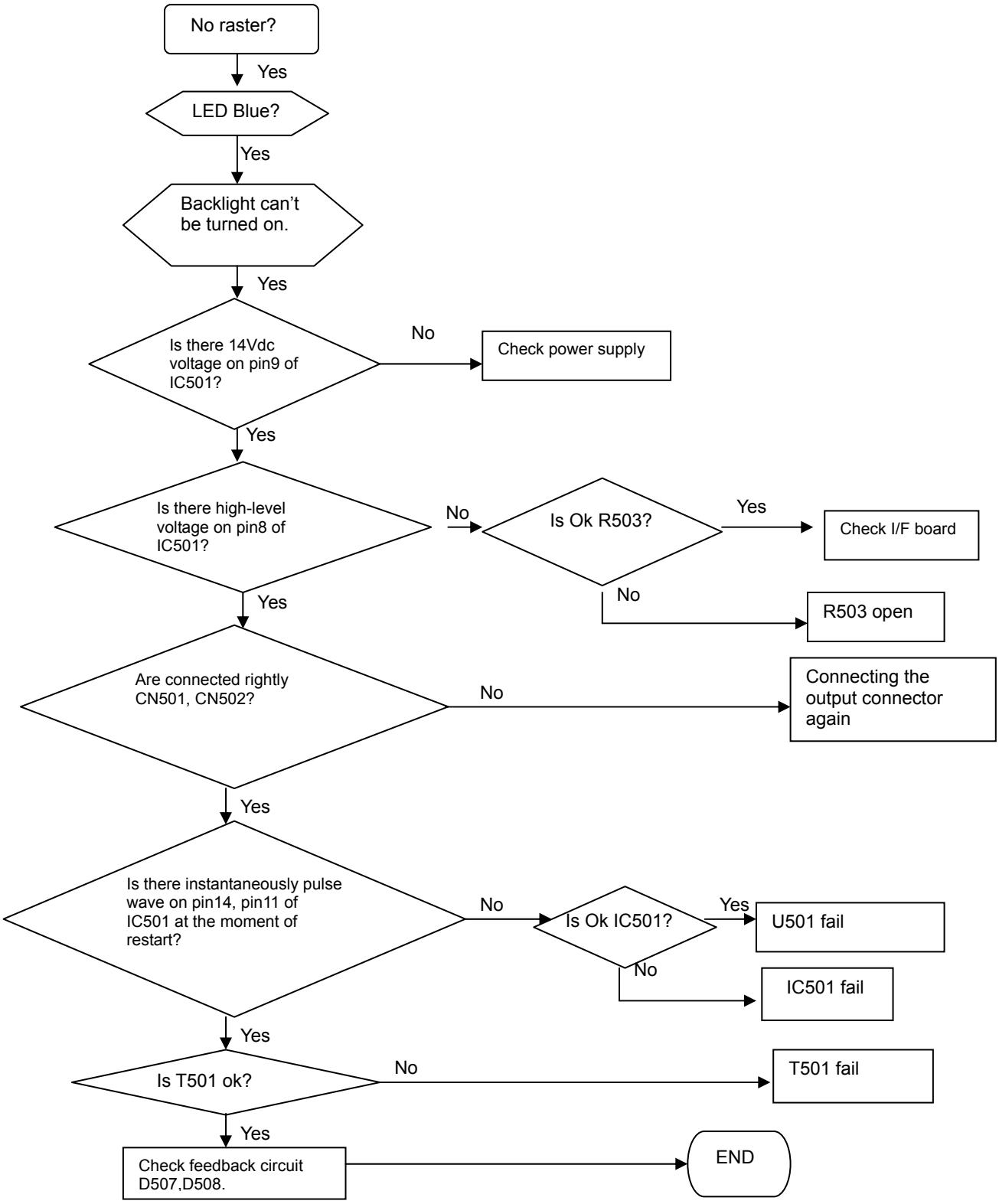
1 No Power & LED Off



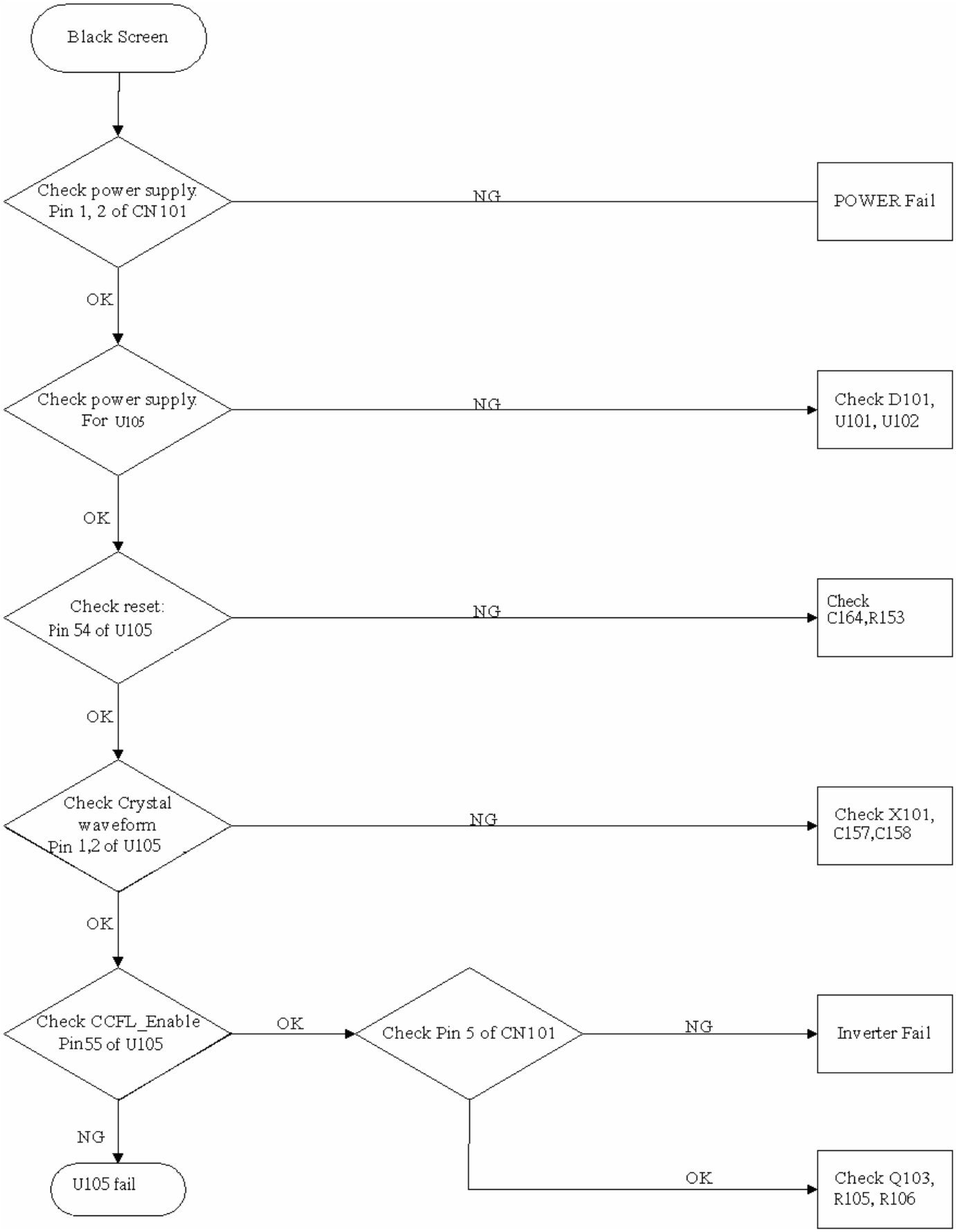
2. DC output voltage is unstable



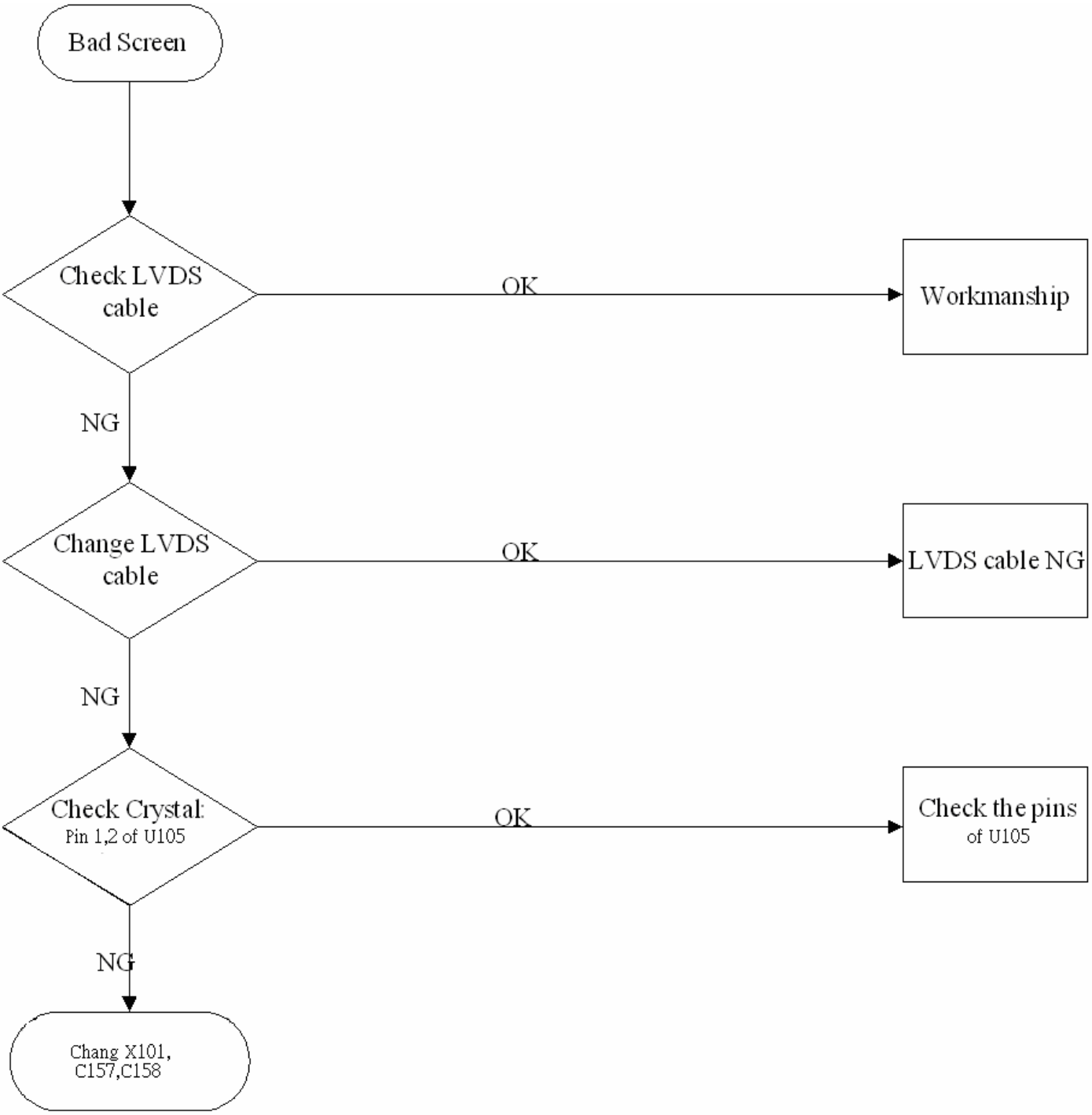
3. No Raster


No raster?
Yes
LED Blue?
Yes
Backlight can't be turned on.
Yes
Is there 14Vdc voltage on pin9 of IC501?
No
Check power supply
Yes
Is there high-level voltage on pin8 of IC501?
No
Is Ok R503?
Yes
Check I/F board
No
R503 open
Yes
Are connected rightly CN501, CN502?
No
Connecting the output connector again
Yes
Is there instantaneously pulse wave on pin14, pin11 of IC501 at the moment of restart?
No
Is Ok IC501?
Yes
U501 fail
No
IC501 fail
Yes
Is T501 ok?
No
T501 fail
Yes
Check feedback circuit D507,D508.
END

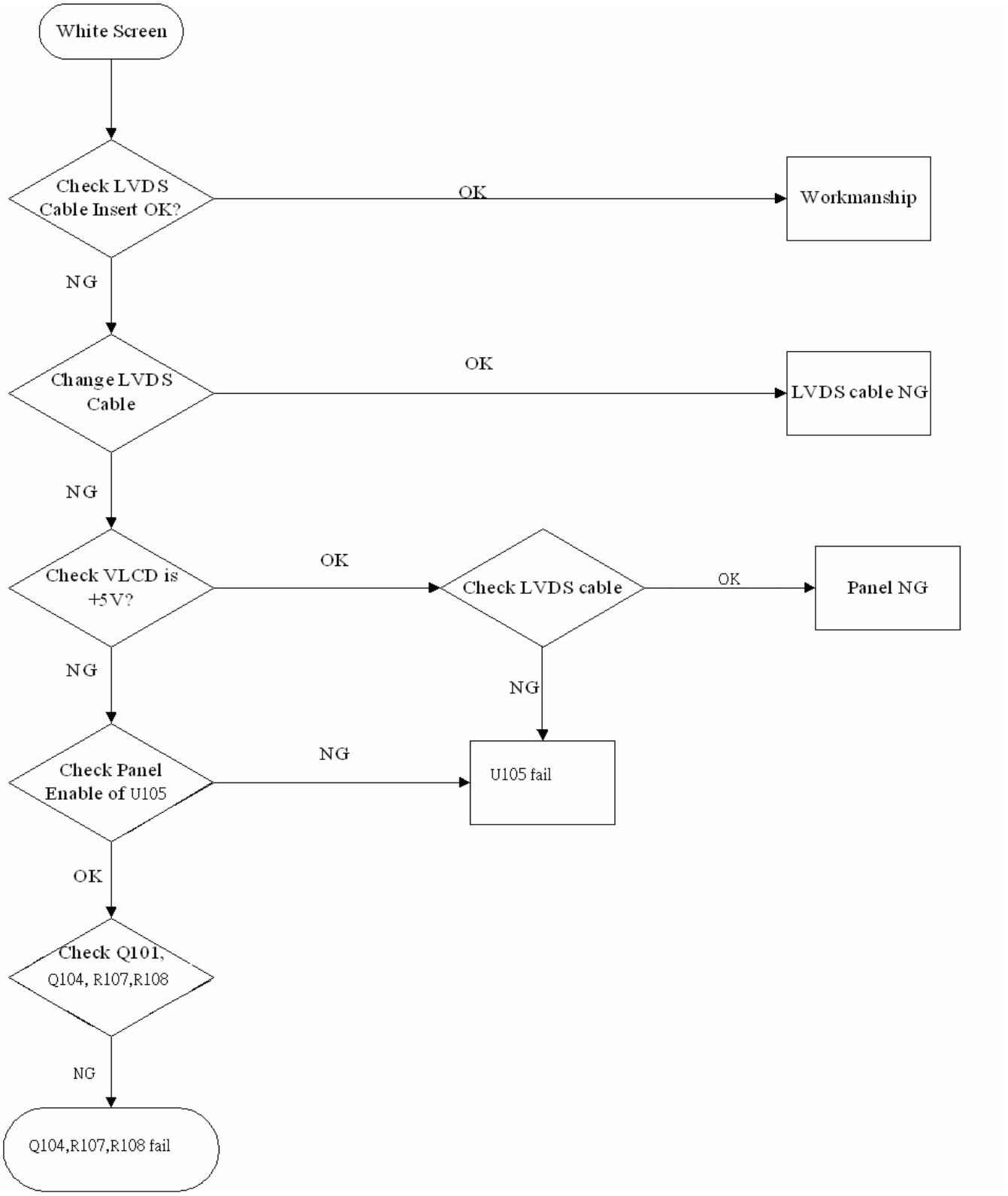
4.Black Screen



5. Bad Screen


Bad Screen
Check LVDS cable
OK
Workmanship
NG
Change LVDS cable
OK
LVDS cable NG
NG
Check Crystal:
Pin 1,2 of U105
OK
Check the pins
of U105
NG
Chang X101,
C157,C158

6. White Screen

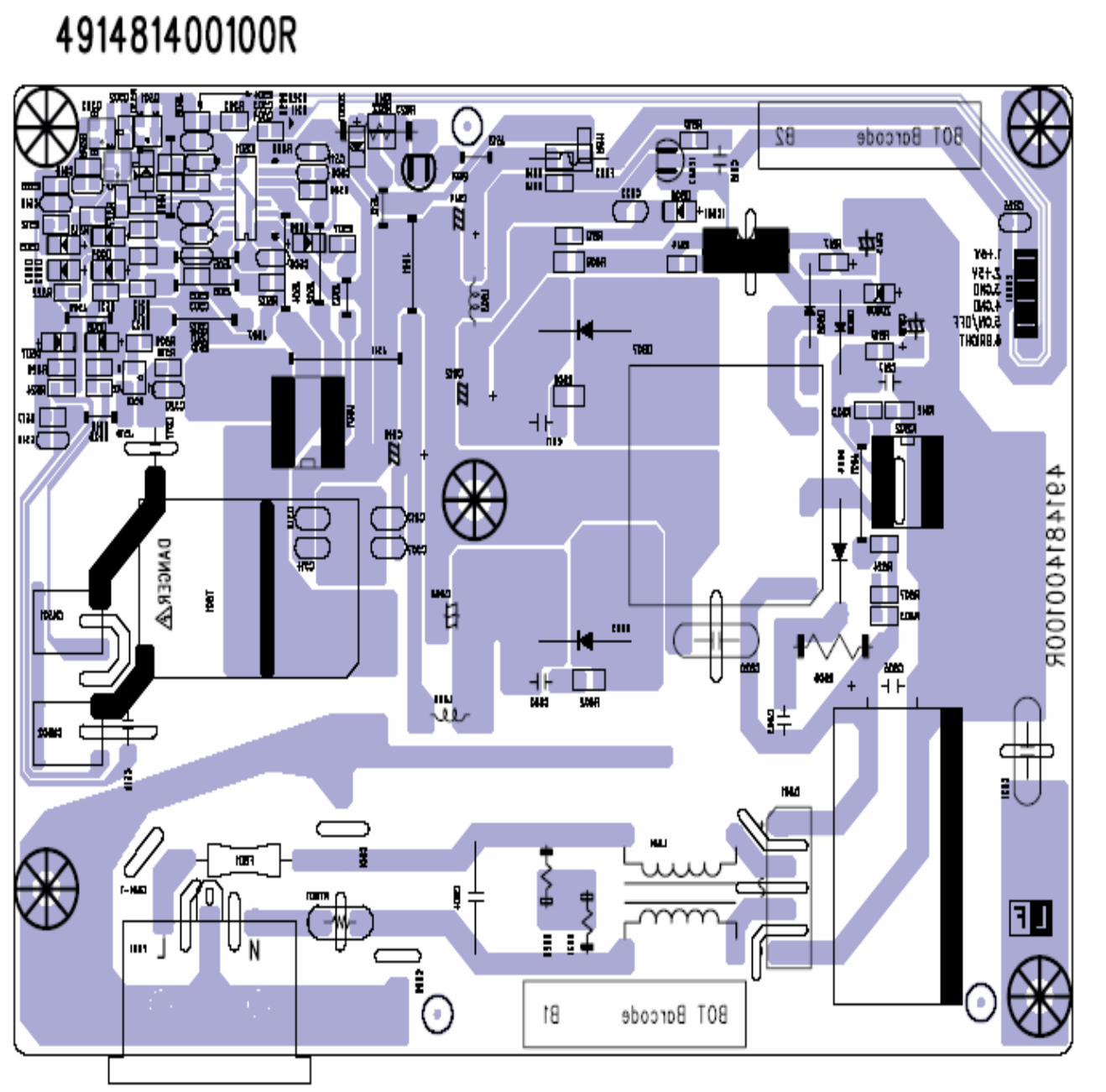


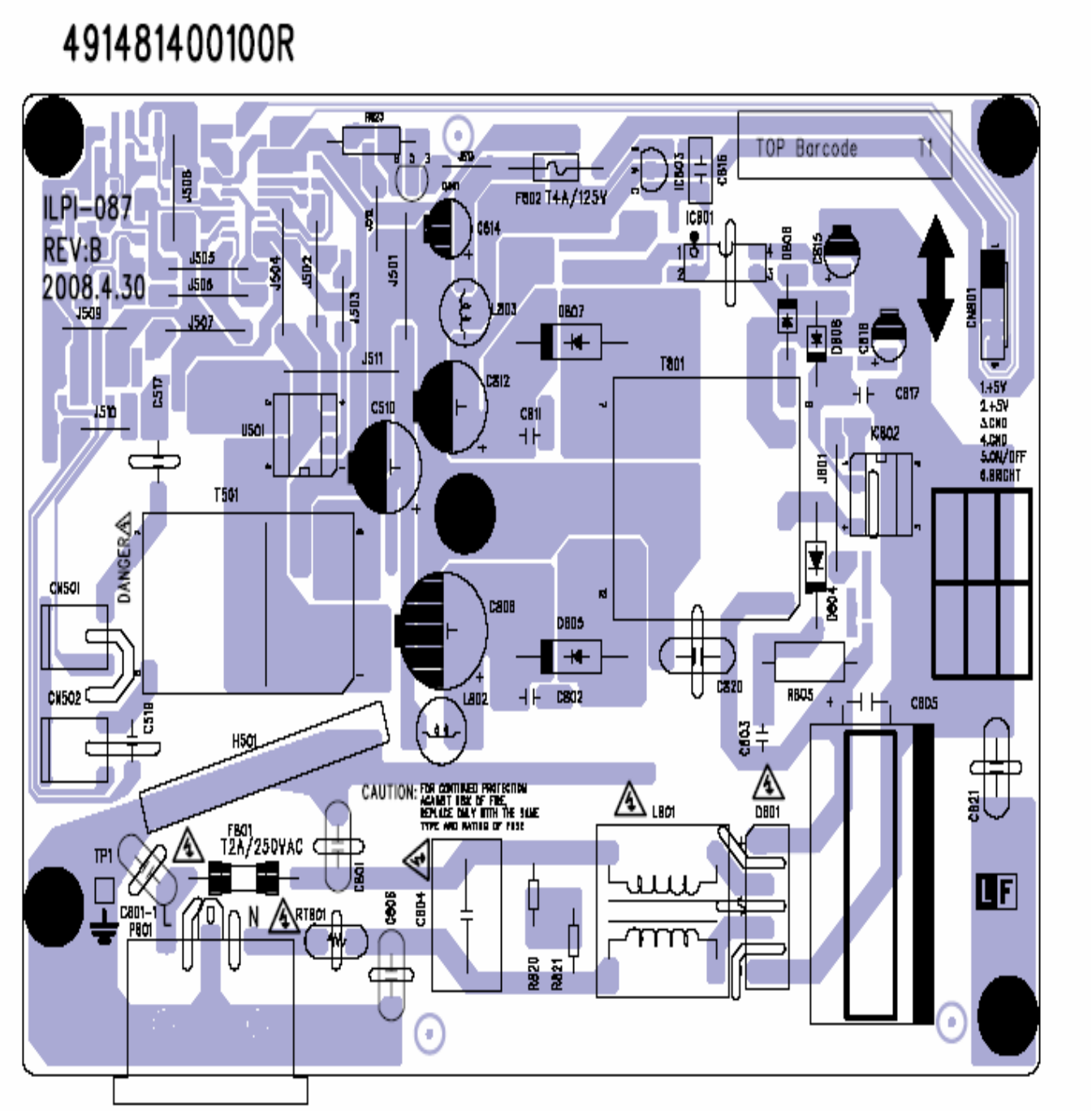
05 Spare Parts List

INL P/N	Description	MOQ
791791300500R	PCBA,I/F BOARD,W/O,LE15F9-510,ROHS	20
791551400500R	PCBA,P/I BOARD,W/O SPK,LE15E1-510 ROHS	20
791791500000R	PCBA,KEYPAD BOARD,LE15F9-510 ROHS	20
453070801190R	PWRCORD 16A/250V BLK 6FT VDE/KTL H05VV-F	20
453010100470R	CABLE D-SUB 15P MALE 1.5M BLK/BLUE ROHS	20
430303001630R	HRN LVDS FFC 30P 125mm ROHS	20
430300802000R	HRN ASS'Y 171mm 2X4PW/O4P,8PTO 1X8P W/O7	20
714050017700R	Assy,back cvoer，for CMO,for out,LE15F9	20
714030018901R	ASSY, BEZEL,BLACK,for out,LE15F9	20
714011204100R	stand le15F9	20
714020015100R	Assy,base cvoer,for out,LE15F9	20
501020223400R	back cover，for CMO,for out,LE15F9	20
701000010200R	Assy Chassis for CMO for out LE15F9	20
631102050170R	LCP 15.6"M156B1-L01-901(A) (CMO)ROHS	10

06 Schematics and Layouts

6.1 PI BD Layout

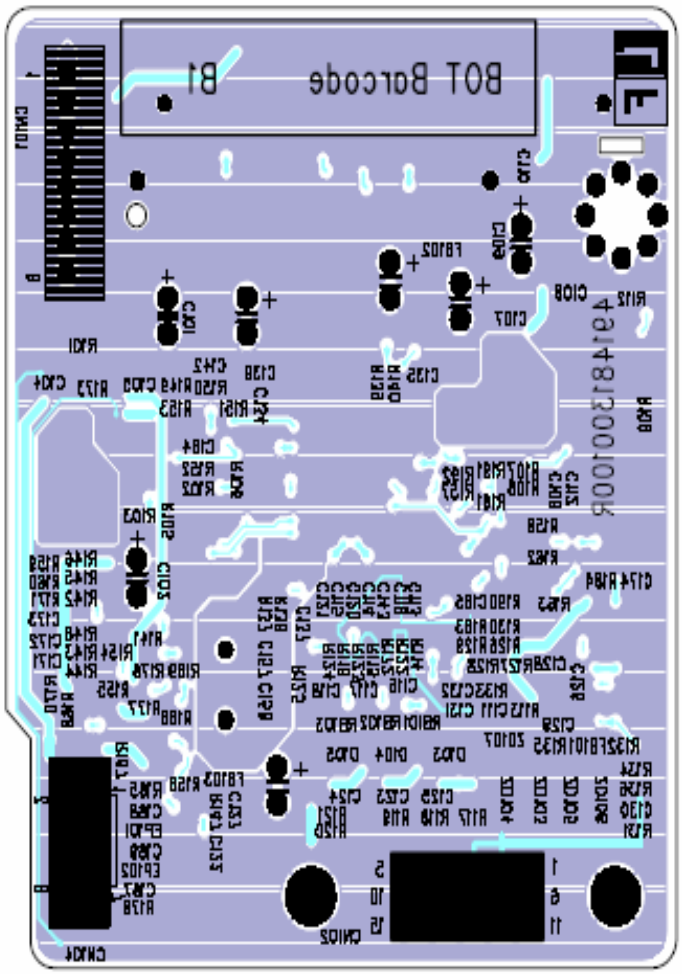


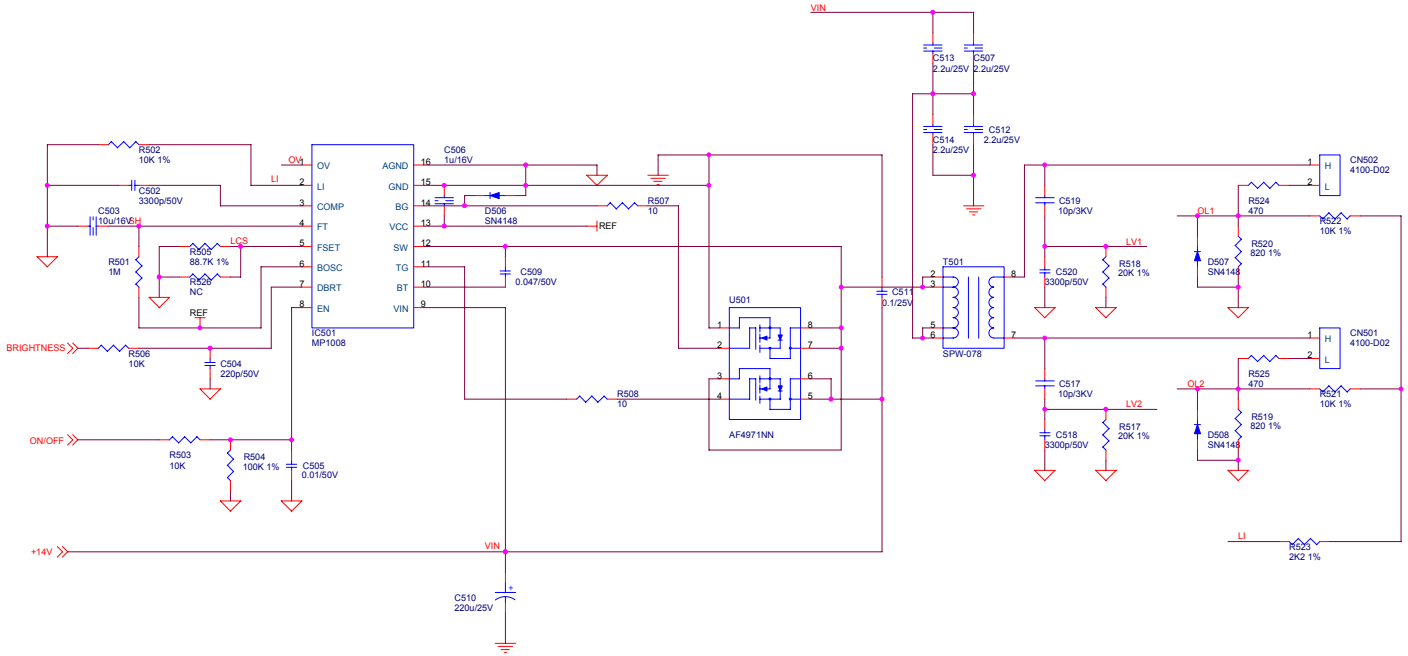

491481400100R
ILPI-087
REV:B
2008.4.30
TOP Barcode T1
FB02 T4A/125V
ICB01
T801
T501
U501
H501
CN501
CN502
DANGER
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH THE SAME TYPE AND RATING OF FUSE
FB01 T2A/250VAC
TP1
RT801
LF

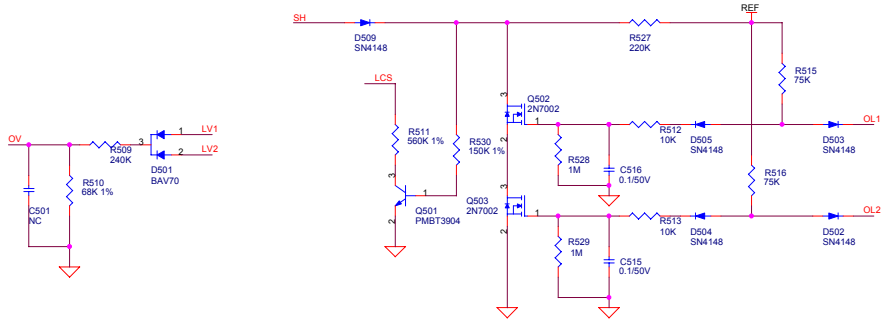
6.2 IF BD Layout

LAYER	SILKSCREEN BOTTOM			
PCB NO :	491481300100R	REV :	A	DESIGNER: XIN KE
FILE NAME :	ILIF-090. PCB	DATE :	2008.03.27	

491481300100R







InnoLux		
Document Number : doc	**SIZE :** C	**APPRO BY :**
TITLE : Inverter SCH		**CHECK BY :**
DATE : 2008-01-02		**DRAWN BY :**
SHEET 4 **OF** 4	**Rev :** 01	

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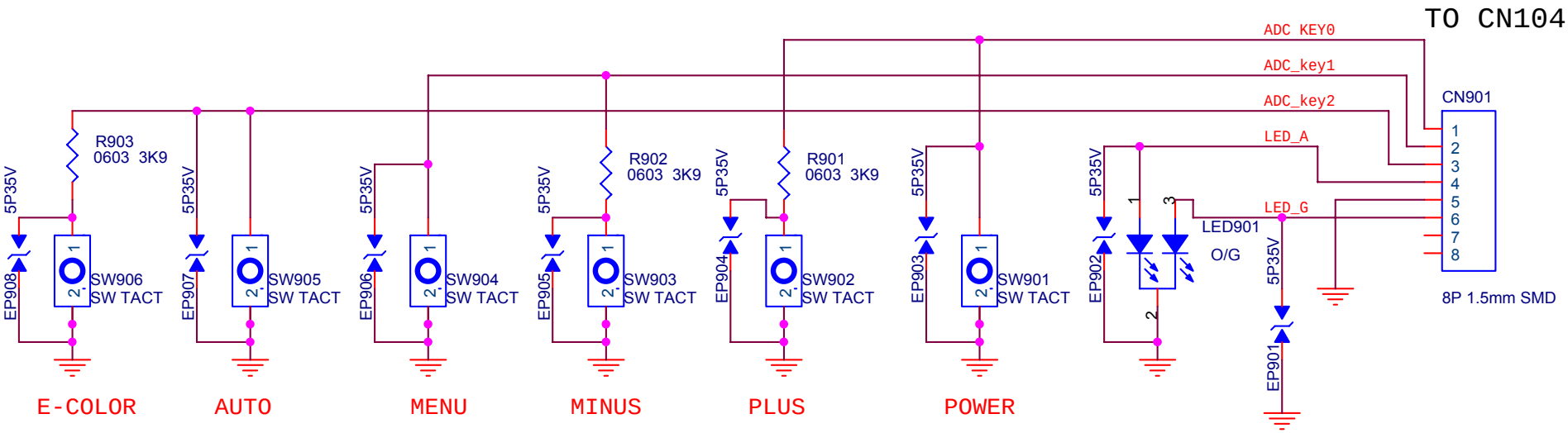
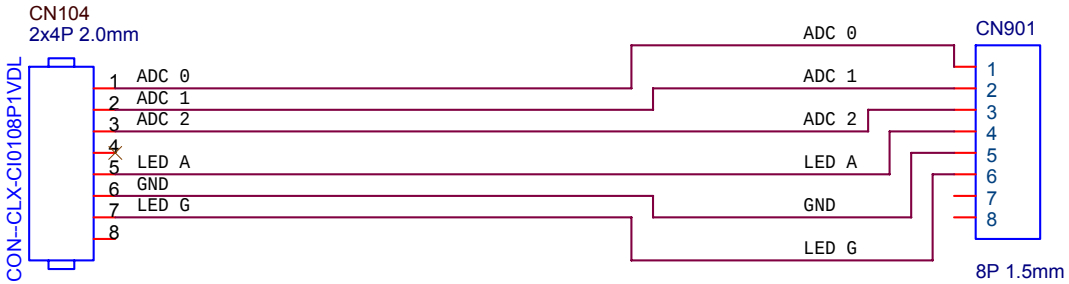
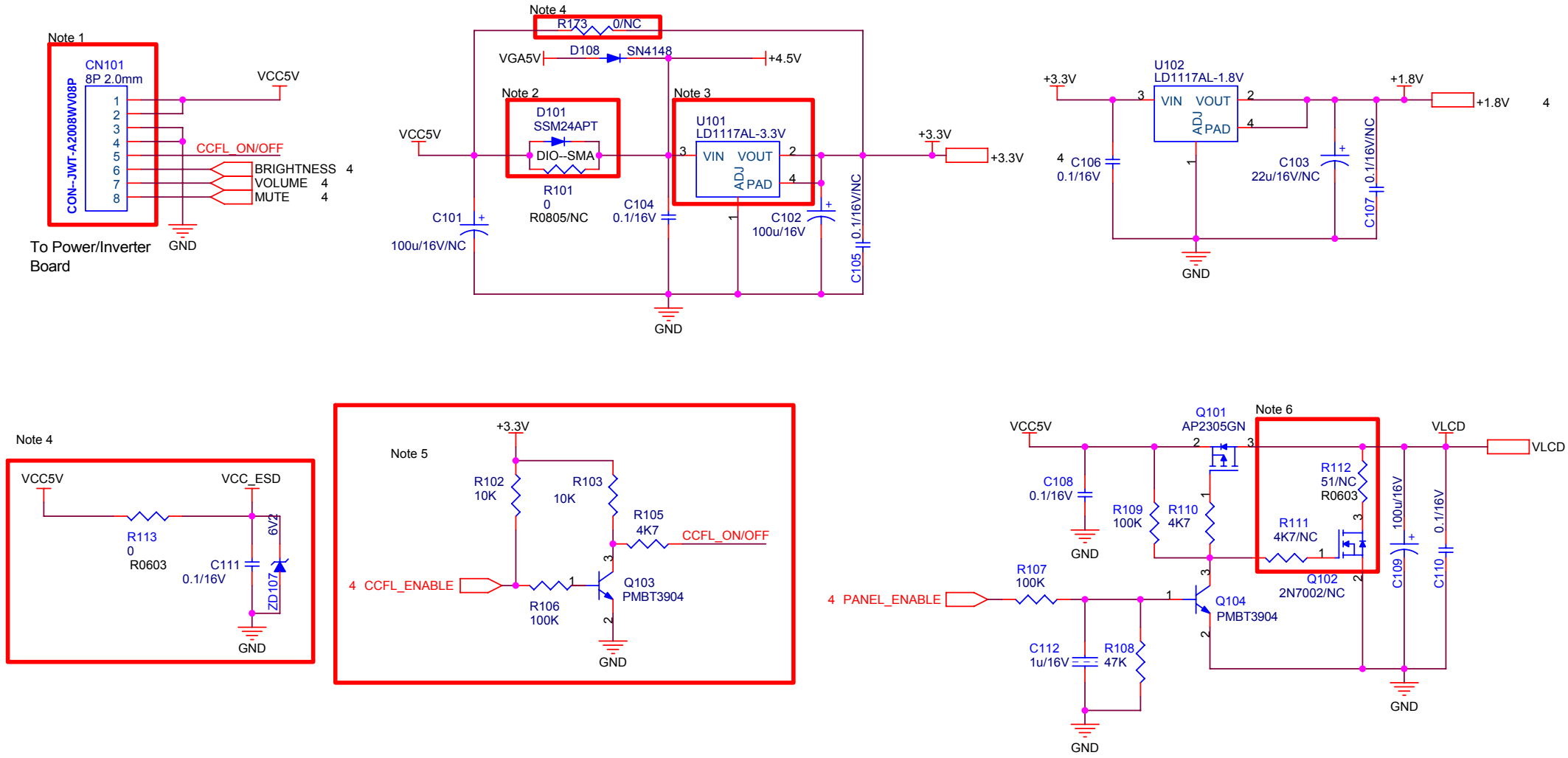
Size C	Document Number <Doc>	Rev <RevCode>
Date: Wednesday, April 09, 2008	Sheet 1 of 1	



Title <Title>		
Size A	Document Number <Doc>	Rev <RevCode>
Date: Wednesday, April 09, 2008	Sheet 1 of 1	



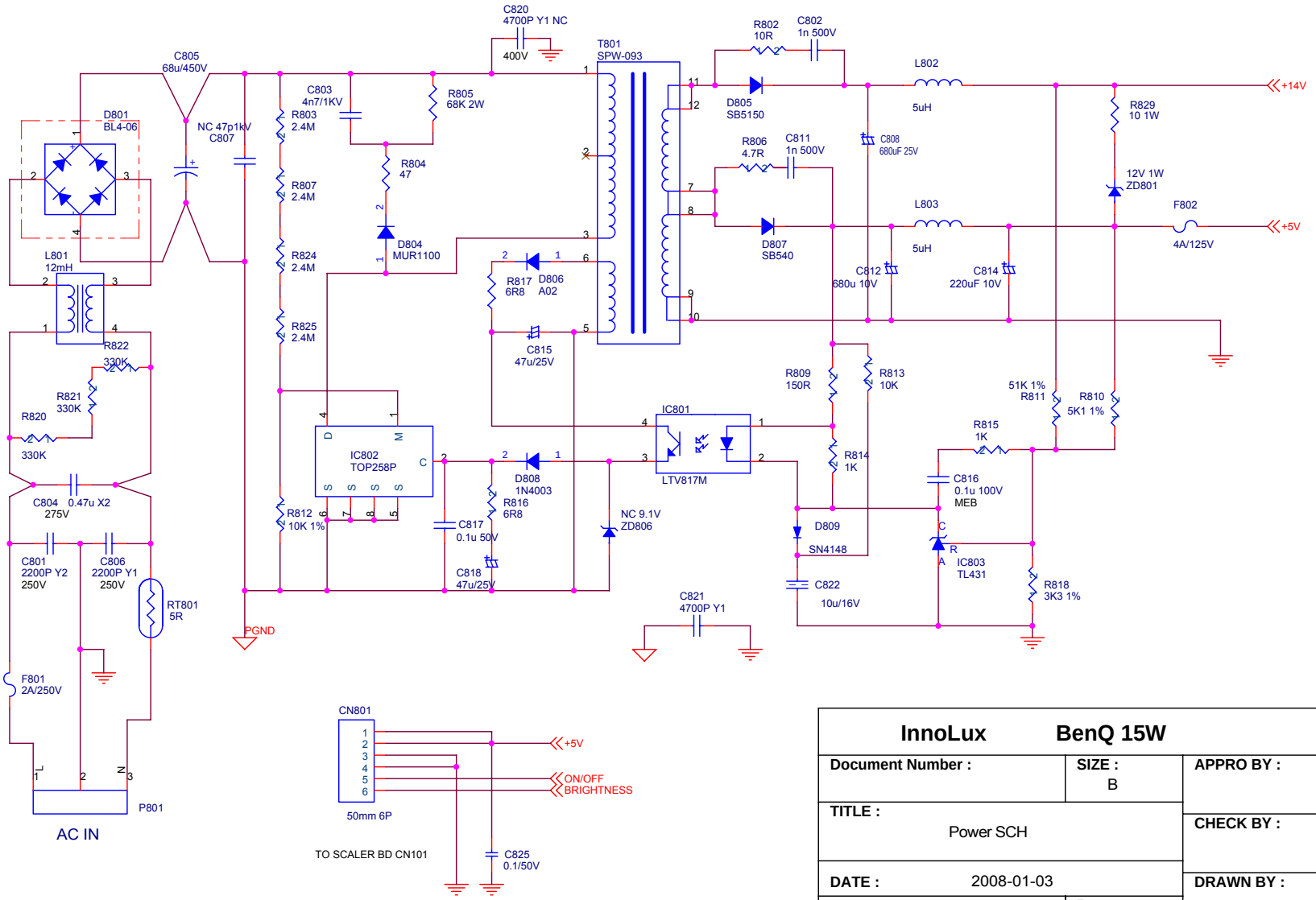
Title <Title>		
Size A	Document Number <Doc>	Rev <RevCode>
Date: Wednesday, April 09, 2008	Sheet 1 of 1	



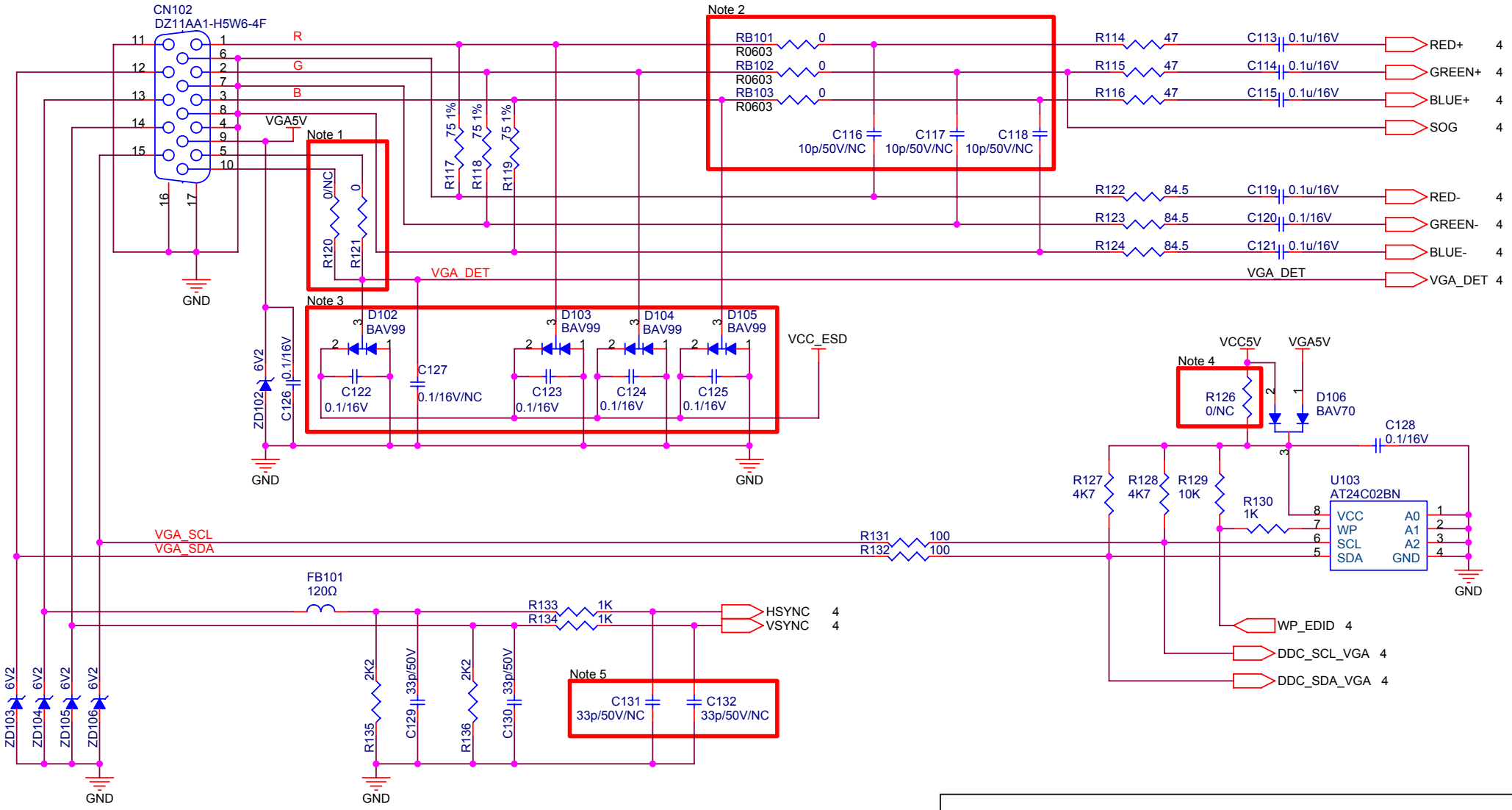
Note:

1. CN101 is no locked packgae for normal model.CN101 is locked packgae for special model(Dell).
2. D101 must be co-layed with R101
3. U101 must contain TO263, TO252 and SOT223 package
4. Reserved for 3.3V panel.
5. Low enable.
6. Reserved R111,R112,Q102 for panel power discharge.

InnoLux Mstar 1PFR Common Board		
Document Number : 1PFR	**SIZE :** A4	**APPRO BY :**
TITLE : POWER (DC TO DC)		**CHECK BY :**
DATE : 2008-1-26		**DRAWN BY :**
SHEET 2 **OF** 4	**Rev :** V02	



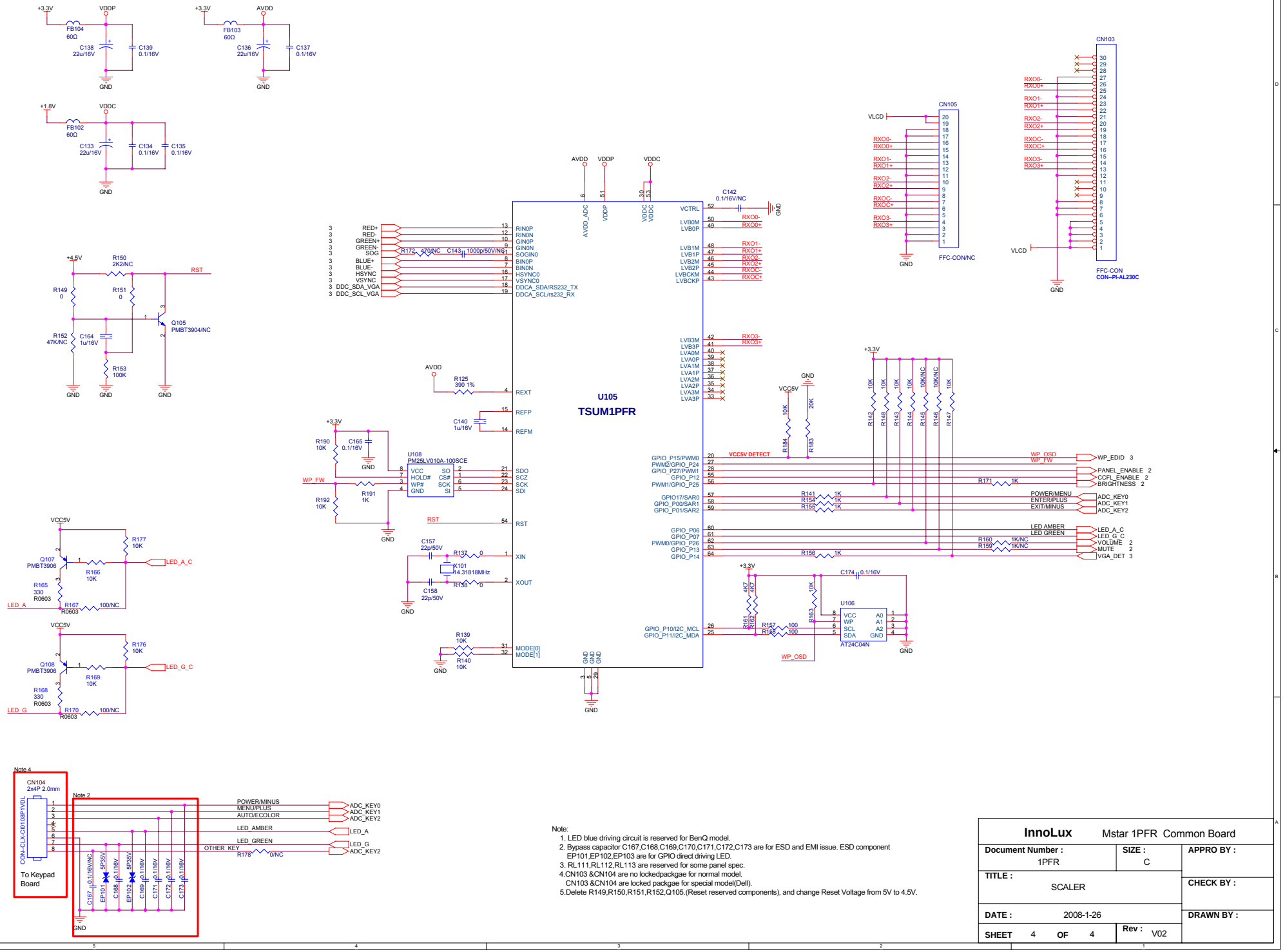
InnoLux	**BenQ 15W**		
Document Number :		**SIZE :** B	**APPRO BY :**
TITLE :	Power SCH		**CHECK BY :**
DATE :	2008-01-03		**DRAWN BY :**
SHEET 2 **OF** 3		**Rev :** V01	



Note:

1. R120 is reserved for Samsung model.
2. R0603 package for Bead. C116,C117,C118 are reserved for EMI or performance issue.
3. C122,C123,C124,C125 are reserved for ESD or EMI issue.
4. R126 is reserved for Samsung model.
5. C131,C132 are reserved for tuning performance issue.

InnoLux	Mstar 1PFR Common Board	
Document Number : 1PFR	**SIZE :** A4	**APPRO BY :**
TITLE : VGA-INPUT		**CHECK BY :**
DATE : 2008-1-26		**DRAWN BY :**
SHEET 3 **OF** 4	**Rev :** V02	



Note:
1. LED blue driving circuit is reserved for BenQ model.
2. Bypass capacitor C167,C168,C169,C170,C171,C172,C173 are for ESD and EMI issue. ESD component EP101,EP102,EP103 are for GPIO direct driving LED.
3. RL111,RL112,RL113 are reserved for some panel spec.
4.CN103 &CN104 are no lockedpackgae for normal model.
CN103 &CN104 are locked packgae for special model(Dell).
5.Delete R149,R150,R151,R152,Q105.(Reset reserved components), and change Reset Voltage from 5V to 4.5V.

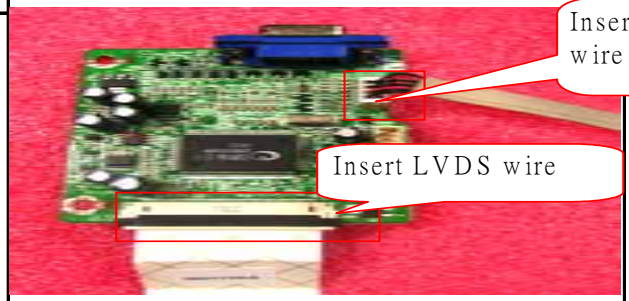
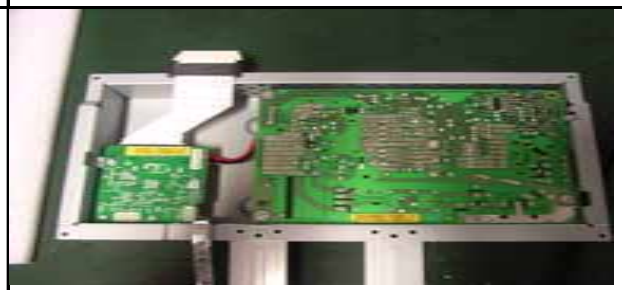
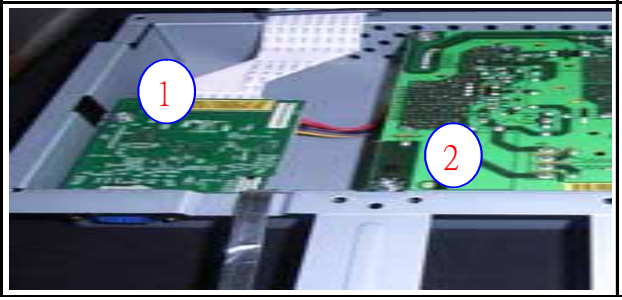
InnoLux	Mstar 1PFR Common Board		
Document Number : 1PFR		**SIZE :** C	**APPRO BY :**
TITLE : SCALER			**CHECK BY :**
DATE : 2008-1-26			**DRAWN BY :**
SHEET 4 **OF** 4		**Rev :** V02	

7.0 Assembly and Disassembly

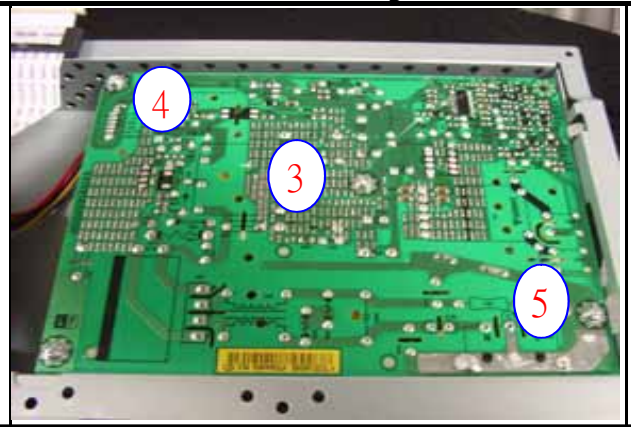
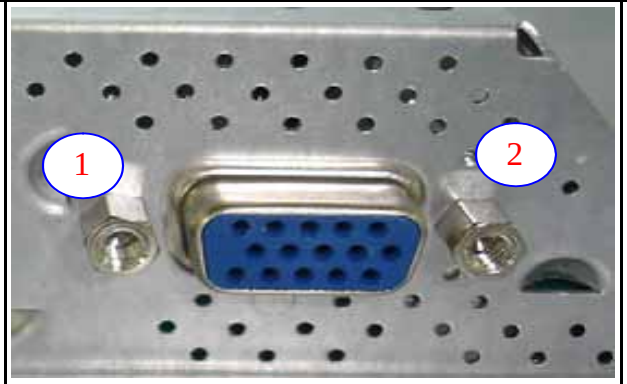
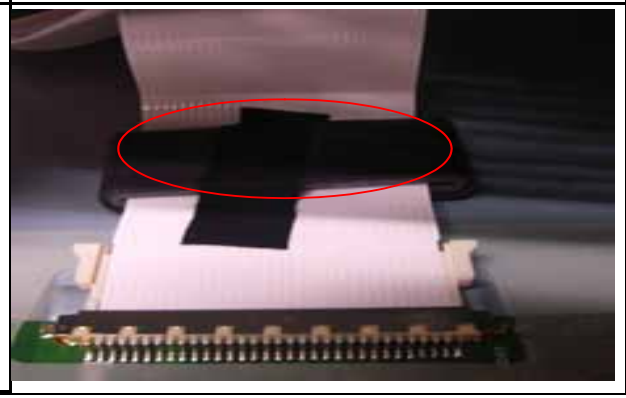
The tool of Assembly and disassembly : 1) Electrostatic gloves 2) Electric screwdriver: the lengthe of screwdriver top is 10±0.5cm ;the diameter of screwdriver top is Φ5*H5mm

Sequence	Item	Photo	Procedures	P/N	Description
S1	Place panel		(1).Take panel out of box and place it on the foam. (2).Tear open the PE bag and put it in the designated carton. (3).Place panel on the foam like the attached picture. Remark:Do not touch the lamp cord and place the surface of panel downsides on the cush	631102050170R	LCP 15.6"M156B1-L01-901(A) (CMO)ROHS
S2	Assemble front bezel		1.Reverse the panel by 180 degree,put the surface of panel upsides and insert front bezel in the panel. 2.Reverse the panel by 180 degree using both hands,put the surface of panel downsides and make sure FFC interface is closer to operator. 3.Paste tinfoi	714030018901R	ASSY, BEZEL,BLACK,for out,LE15F9
S3	Fix chassis		Place the chassis on the cushion after check,like the attached Picture1.	701000010200R	ASSY,Chassis,W/O Audio,LE15E1

Assembly and Disassembly (continue)

S4	Fix chassis &powebo ard		Insert powerboard into the designated location of chassis ,like the attached Picture	791551400500R	PCBA,P/I BOARD,W/O SPK,LE15E1-510 ROHS
S5	Insert mainboar d's wrie		1.Check if the mainboard and relevent wire you choose are OK. 2.Insert the wire into the main board like the Picture	791791300500R	PCBA,I/F BOARD,W/O,LE 15F9-510,ROHS
S6	Connect mainboar d&powerb oard		Connent powerboard with the relevant PIN in the mainboard like the attached Picture	430303001630R	
S7	Twist PCBA screw		Handle electric opener and 2pcs of M3* screw	509146306200R	SCREW,P,CROS S,W/WAS,M3*6, Zn-Cc

Assembly and Disassembly (continue)

S8	Twist PCBA screw		Fix 3 pcs of screws separately on the poweboard and mainboard like the attached Picture1	509146306200R	SCREW,P,CROSS,W/WAS,M3*6,Zn-Cc
S9	Twist Hexagonal screws		(1). Handle hexagonal screws and electric opener (2). Twist screw in the interface like the attached Picture.	509116612100R	SCREW,P,CROSS,M4*12,Zn,ROHS (NYLOK)
S10	Insert LVDS wire into panel		1.Tear off the adhensive tape of FFC wire; 2.Insert FFC wire into the interface of panel 3.Put FFC wire in order and paste them on the panel 4.Fix chassis on the back of panel	430303001630R	HRN LVDS FFC 30P 125mm ROHS

Assembly and Disassembly (continue)

S11	Insert lamp wire		Thread lamp wire into the relevant hole of chassis like the attached Picture		
S12	Assemble keypad		Assemble keypad as picture	790071500000R	PCBA,KEYPAD BOARD,LE1973 ROHS
S13	Assemble cover back and stand		Check if back cover and stand is fixed properly	714011204100R	stand le15F9
S14	Packing cushion		put the monitor into the cushion as picture	506060011210R	CUSHION, LEFT, LE15F9